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BULLETIN
OF THE
ESSEX INSTITUTE,
VOLUME XIX.

1887.

SALEM, MASS.
PRINTED AT THE SALEM PRESS,
Jan 1888.

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Dec 16. 1887

BULLETIN
OF THE
ESSEX INSTITUTE.

VOL. 19. SALEM: JAN., FEB., MARCH, 1887. Nos. 1-2-3.

ON THE WEST INDIAN TEIIDÆ IN THE MU-
SEUM OF COMPARATIVE ZOOLOGY.

BY SAMUEL GARMAN.

THE greater part of the collection on which this notice is based was gathered for Professor Alexander Agassiz by the writer. The balance was purchased by the Museum from Messrs. F. Lagois, C. S. Cazabon, Dr. D. F. Weinland and others. As far as possible series were obtained, the better to enable one to fix upon the characteristics of the varieties of a species inhabiting several of the islands, or those of closely allied species from the same or different localities. In the result the number of species has been augmented, instead of reduced as was expected.

TUPINAMBIS NIGROPUNCTATUS *Spix*, 1825.

Specimens from Trinidad apparently have the scales somewhat larger and the femoral pores in greater number. The pores range from fourteen to seventeen. The species is called "Matt" by the natives.

CENTROPYX COPH, nom. sp. n.

Barbadoes.

"Back with three pale lines; dorsal scales, minute. Surinam, Mus. Leyd." is the original announcement, of his species *Centropyx intermedius* (Schleg.), by Dr. Gray, 1831, Syn. Rept., 31 (in Griff. Cuv. An. King., ix). In his Catalogue of Lizards B. M., 1845, he says *C. intermedius* is synonymous with *C. calcaratus*.

Professor Cope, 1861, Pr. Phil. Ac., 496, is the first to give a description which unquestionably applies to the *Centropyx* of Barbadoes. Whether Dr. Gray was right in his later conclusion in regard to what he had called *C. intermedius*, it is evident he was not acquainted with the Barbadian type. Hence it would appear preferable that the latter should bear the name of the distinguished naturalist who first made it known.

AMEIVA ATRIGULARIS.

A. surinamensis, var. n.

Nostril between the two nasals; five occipitals, longer than broad; four supraoculars, posterior three commonly separated from the supraciliaries by a series of granules of which the anterior is large and rhomboid in shape, third not separated from the postfrontals and not in contact with the frontal; six to seven supraciliaries; loreal undivided; six labials. Lower labials five to six; submentals one anterior and four pairs or more; gular granules much enlarged in a broad band across the throat, postgulars enlarged in the middle; mesopterygium with several rows as large as the largest gulars; no wedge-shaped backward intrusion between the pectorals on the chest. Dorsal granules small, smooth. Ventrals in twelve (twelve to fourteen) rows; transverse series thirty to thirty-two. Preanals irregular, commonly three large

shields arranged in a triangle, with a small plate wedged behind the suture of the posterior two, and the triangle itself arched around in front by about eight small plates of which the posterior are the larger. Three or four rows of medium-sized brachials, subcontinuous with the three or four rows of antebrachials; postbrachials in three or four rows, smaller than brachials. About ten rows of femoral plates, and five of tibials. Femoral pores sixteen to seventeen. Digits feebly serrated; fifth toe much shorter than inner. Caudals keeled.

Back, brownish olive, with closely placed spots or vermiculations of brown; flanks more olive, with or without dark-edged white spots; outer ventrals and thighs with large spots of white, or of black, or of both. Near the vent the lower surface is yellowish. The throat and chin are black on all except the young.

Small ones have a dark band along each side of the body at the upper edge of flank and tail; on the body near each edge of this band there is a series of small round white spots. Below the band the flank is lighter. On the front edges of the outer ventrals, on the femorals and on the base of the tail, there are black spots, and the throat is olive.

Hab. Trinidad.

AMEIVA AQUILINA.

A. surinamensis var. n.

Nostril between the two nasals; five occipitals; four supraoculars, posterior two separated from other head shields by granules, anterior one in contact with supraciliaries; loreal undivided; labials six to seven. Lower labials six to seven; submentals one anterior and four or five pairs; gular granules enlarged in a band, of eight series or more, across the throat; behind the gulars there

is another band of smaller ones; mesoptychials nearly as large as gulars, in six to eight series, reaching across the lower surface. Dorsal granules small, smooth. Ventrals in fourteen rows, outer small, transverse series thirty-one to thirty-three. Anteriorly on the chest there is no intrusion of granules between the median series of plates. Preanals most often in transverse series, two to six of the median plates enlarged; sometimes with three larger shields arranged in a triangle. Brachials moderate, in three or four rows, second row largest; antebrachials in three rows, outer broad; postbrachials small. Ten or eleven rows of femoral plates, and four or five of tibials. Femoral pores eighteen to twenty-two. Digits serrated; fifth toe shorter than inner. Caudals keeled.

Four of the specimens from Grenada have the frontal divided transversely, near its posterior extremity; the other four from the same locality are normal and agree with those from St. Vincent, thirty-nine in number, none of which possess the divided frontal shield.

Adults are brown on the back and more or less mottled with black. The flanks are darker in the upper half, more olive in the lower, marked with four to six longitudinal rows of small, rounded, dark edged spots of white. Beneath olivaceous, clouded or marked with lighter, and at the edges of the flanks marked with black. In front and beneath, the thighs are blotched with black and yellow. The white spots also form vertical or transverse series in many cases.

Young with a series of about seventeen transverse bands of brown, separated by spaces of equal width and bisected by a narrow line of lighter color along the vertebrae from the back of the neck. From the eye to the base of the tail a dark band runs along the upper edge of the flank; posteriorly it is broken into spots; along the body its

edges are deeply scalloped and in the concavities of the scallops there are white spots. Below the^b dark band a lighter one extends from the ear to the thigh; and below this on the flank there is another dark band with irregular edges which beneath are rendered more so by the lighter spots.

This lizard resembles *A. bifrontata* especially in regard to the division of the frontal in some specimens. It differs in having fourteen rows of ventrals, in the anal plates, in brachials, antibrachials, postbrachials, and tibials, in the femoral pores, and in coloration.

The specimens from St. Vincent appear to have a greater number of brighter, more distinct spots both of white and black and they have undivided frontals; beyond these I am unable to fix upon characters to distinguish them from the others.

AMEIVA FUSCATA sp. n.

Nostril between the two nasals; occipitals irregular, six or more; supraoculars three; on one specimen a fourth hardly larger than the granules is present; supraciliaries seven to nine; loreal undivided; labials six to seven. Lower labials six to seven; submentals one anterior and six or seven pairs; gular granules much enlarged in a band across the throat; mesopterygium with a band, of six or seven scales longitudinally and about twenty transversely, in which the largest are larger than the gulars; two bands of slightly enlarged granules between the gular band and the fold. Dorsal granules small, smooth, larger than those of the flanks. Ventrals in fourteen rows, outer small; transverse series thirty-three. Pre-anal plates in a single longitudinal series of four larger, surrounded by smaller plates of which one at each side of

the posterior of the larger series is largest. Three or four rows of small brachial plates, second row largest; antebrachials one row of large and three rows of small ones; postbrachials small. Eight or nine rows of femoral plates and five of tibials. Twenty-six to twenty-eight femoral pores. Digits serrated; fifth toe shorter than the inner. Caudals keeled.

Dorsal surface of body, head and legs uniform olive brown; flanks darker to black with three series of white spots, the first of which extends along the upper edge to the base of the tail, the second is the more irregular and extends on the thigh, and the third runs along the outer series of ventrals. Lower surface olivaceous, darker under throat and fold, lighter and yellowish near the vent and under the legs. Under the fold the throat is white. Tail sprinkled with brown.

Young ones are lighter colored and have a narrow light line along the upper edge of each flank and a second half way down the side including between them a darker band on which posteriorly there are a few lightish spots.

Hab. Dominica.

AMEIVA PLUVIANOTATA sp. n.

Nostril in the posterior border of the anterior nasal; occipitals irregular, seven or more; four supraoculars; seven or eight supraciliaries; loreal undivided; six labials. Six lower labials; submentals one anterior and five pairs. Enlarged gular granules form a band of eight or ten series across the throat, median larger; mesopterygium with several rows of enlarged scales, of which those toward the sides are larger than the median and larger than the gulars. Dorsal granules very small, smooth, median slightly enlarged. Ventrals in fourteen rows, transverse series

thirty-six. There are two types of preanals: the first has a median longitudinal series of four or five of which the posterior one is small and the others from the next in front of it decrease in size forward, and at each side of the longitudinal there is a short transverse series of two scales or more; the second type has the small posterior scale of the median series separated from the next in front by the middle pair of a continuous transverse row. In the latter the arrangement is similar to that of *A. riisii*. Four or more rows of small humeral plates, not continuous with the antebrachials. Antebrachials in three rows, posterior broad. Postbrachials few, largest two equal in size to humerals. Seven or eight rows of femoral plates; four rows of tibials. Femoral pores twenty-nine to thirty-four. Digits serrated; inner toe a little longer than outer. Caudals keeled.

Large specimens brownish olive on back and head; posteriorly and on legs and tail freckled with greyish. Throat, chest and arms dark olive, lighter and freckled with light posteriorly; lower surfaces of legs white.

On smaller specimens the color of the back is lighter, with faint indications of a series of dark spots on each side of the middle; the grey plashes are more numerous and distinct and on arms and legs they are smaller, closer together and brighter. The flanks have numerous greyish spots and at the upper edge and on the base of the tail there is a dark band with indistinct margins. The lower surfaces are light olive.

On some the dark color surrounding the grey spots is more intense; these might be described as reticulated with brown. Very small specimens are without white lines, but the color is somewhat lighter at the upper edge of the dark band on the flanks.

Hab. Montserrat.

*AMEIVA ATRATA.**A. corvinæ* var. n.

Nostril in the posterior part of the anterior nasal; occipitals short, five to seven; supraoculars four, posterior half as large as the anterior; supraciliaries seven; loreal not divided; labials six. Lower labials five to six; submentals one anterior and five to six pairs; slightly enlarged gular granules in about twelve series across the throat; mesoptychium with a band of about half a dozen series, in which the largest ones are toward the sides of the neck and larger than the gulars. Dorsal granules small, smooth. Ventrals in fourteen rows; transverse series thirty-six. Preanal plates in a transverse series of four to twelve, outer very small, median pair large; there is a small plate behind the suture of the median pair, and in front of this suture there is another pair of large plates placed one in front of the other. Around the latter pair there is an arch, of five or more smaller scales, which continues laterally as transverse series. Four series of very small brachials, not continuous with the five series of comparatively small antebrachials more than half of the larger of which are subdivided. Post brachials few, small, similar to brachials. Nine or ten rows of femoral plates; four to five rows of tibials, outer large. Femoral pores twenty-nine to thirty. Digits feebly serrated; outer toe a little longer than the inner. Dark brown above; dark olive beneath.

In comparison with type specimens of *A. corvina* from Sombrero and from Hayti, this form shows greater enlargement of granules on throat and mesoptychium, larger scales in the group on the chest wedged between the pectoral plates, on the median line behind the fold, and larger brachials. The third supraoculars are not separated from frontal and postfrontals. On all the specimens of *A. cor-*

vina at hand the third supraocular is separated from the angle of the frontal by the elongate anterior granule of the series.

Hab. Redonda.

AMEIVA ERYTHROCEPHALA.

Lacerta erythrocephala Daud., 1802, Rept., iii, 122.

Nostril between the two nasals; five occipitals; four supraoculars, posterior small, posterior two separated from other cephalic shields by granules; six or more supraciliaries; loreal undivided; seven labials, third and fourth largest. Six lower labials, third largest. Submentals one anterior and six or seven pairs, second and succeeding separated from the lower labials by enlarged granules or small scales; median gulars somewhat enlarged, as also some others at each side of these about half way to the ear; three series of about five enlarged scales each on the mesoptychium, and around these one to several series of small ones which shade into the surrounding granules. Dorsal granules very small, uniform, smooth. Ventrals in fourteen rows, thirty-six transverse series. A pair of moderate sized median preanals, at each side of which there are two or three smaller ones and in front of which there is a single longitudinal series of two or three. Brachials in four or five series, as large as the enlarged gulars; antebra-chials in one series of four to six broad plates and three or four of small ones; postbrachials small. Femoral shields in six rows; tibials in five, outer large. Digits serrated; outer toe longer than the inner. Femoral pores thirty-seven to thirty-nine. Granules separate the first three or four series of plates on the median line of the chest.

Back olive with narrow transverse lines of black, more or less crooked and reticulated. Thorax, upper arm and flanks blackish. The black includes more or less of the

fold, on the breast and in front of the arms. The head is red, brownish above and white below after the red has disappeared in the alcohol. Limbs olive reticulated with brown or black.

On younger specimens the back is lighter in color, the transverse lines are more distinctly limited and disconnected from similar vertical streaks on the flanks, and the thorax and flanks are olive. Some have on the fore part of the body at the upper edge of the flank a faint line of light. The darker colors lie at the lower edges of the flanks, where there is a tendency to black margins on the scales. The bellies of some are olive, of others yellowish.

On very young ones the light line at each edge of the back extends from the neck to the base of the tail. Half-way down the flank there is another streak extending from the arm to the femur.

Thirty-four specimens were secured on St. Christopher's. They leave no doubt as to the identity of the species and make it evident that the *A. erythrops* from St. Eustatia is not entitled to more than varietal distinction.

AMEIVA ANALIFERA Cope, 1869.

The femoral pores range from twenty-one to twenty-five. St. Barts.

A variety of this species is found on Anguilla. It differs slightly in squamation, but is easily distinguished by the color; lighter brown anteriorly, with large light grey or olive spots posteriorly, which gives the hind legs the appearance of being grey reticulated with brown.

AMEIVA CORVINA Cope, 1862.

Between representatives from Sombrero and others from Hayti there is apparently very little difference.

AMEIVA RIISII Reinh. Lützk., 1862.

Porto Rico specimens appear to be a little lighter in color, more red on the back and head, and have the whitish frecklings on the hinder part of the body and the base of the tail, as also the dark spots along the flank, less numerous and distinct than those from St. Thomas. The latter have the colors a trifle darker, more olive, and the white specks and the black spots less faded.

AMEIVA LINEOLATA D. & B., 1839.

The series exhibits a gradation from the keeled to the smooth caudal scales. A very dark throat marks the largest specimen.

Hayti and San Domingo.

AMEIVA TÆNIURA Cope, 1862.

This species has a larger number of large preanal shields, and the enlarged granules of the mesopterygium are smaller than in *A. lineolata*.

Jeremie, Hayti.

AMEIVA DORSALIS Gray, 1838.

A very common species in the neighborhood of Kingston, Jamaica, where it was the only one captured.

AMEIVA AUBERI Coct.

Not at all rare at Bahia Honda, Cuba.

AMEIVA THORACICA Cope, 1862.

Femoral pores twenty-four in one specimen, twenty-eight in others.

New Providence, Bahamas.

SCOLECOSAURUS CUVIERI *Fitz. ; Blgr.*

Length of head and body two inches, of tail three and three-eighths. Longitudinal rows twenty-eight ; transverse series on the body forty-one, and on the tail eighty-six.

Hab. Grenada.

GYMNOPHTHALMUS PLEII *D. & B.*, 1839.

Twenty-two specimens were secured at Castries, St. Lucia, and others from Martinique. The former have seventeen rows of scales and agree closely with the latter.

Bocourt gives St. Lucia as the locality for *G. Lütkeni*; we failed to secure a specimen in all our collecting.

WEST INDIAN BATRACHIA IN THE MUSEUM OF COMPARATIVE ZOOLOGY.

BY SAMUEL GARMAN.

PHYLLOBATES TRINITATIS sp. n.

Trinidad.

Tongue subcordiform, free behind. Snout shorter than the diameter of the eye, broad, very blunt-angled at the end; nostrils nearer to the tip than to the eye. Loreal region vertical or slightly concave. Tympanum about half the diameter of the eye. When the leg is turned forward the tibio-tarsal articulation reaches the orbit. Skin smooth. Outer metatarsal tubercle small; disks about half as large as the tympanum.

Back greyish-brown with cloudings of darker or with blotches of brown along the median line; legs with transverse bands and arms blotched or banded with brown. A black band around the snout through the eyes, over the shoulders and along the flanks. Upper lips lighter; both lips grow dark with age. Fingers and toes ringed with brown. Ventral surface white; a dark band across the thorax. On one specimen of twenty the chin and throat are dark, and on all the older ones the dark color is inclined to spread backward on the chest.

HYLODES MARTINICENSIS *Tschudi*.

Martinique; St. Kitts; Saba; Dominica; Bayamon, Porto Rico.

HYLODES LENTUS Cope.

St. Thomas; Puerto Plata, San Domingo.

In the specimen from St. Thomas the vomerine teeth are somewhat separated on the median line; these teeth are continuous from side to side in the form from San Domingo. The latter has the upper surface of the legs and the hinder half of the body of a bright-red color in life.

HYLODES LUTEOLUS Gosse; Gthr.

Kingston and Moneague, Jamaica.

HYLODES RICORDI Dum. Bibr.

Matanzas, Cuba.

LEPTODACTYLUS PENTADACTYLUS Laur.; Ptrs.

St. Kitts; Dominica.

LEPTODACTYLUS LONGIROSTRIS Blgr.

Trinidad.

This frog is placed here with some hesitation. On the middle of the flank there is a fold, forming a narrow, white streak, and at the upper edge there is a similar one, more pronounced backward. The back is irregularly spotted with light-edged spots of brown.

LEPTODACTYLUS ALBILABRIS Gthr.; Blgr.

Bayamon and San Juan, Porto Rico.

Very abundant.

LEPTODACTYLUS VALIDUS sp. n.

Kingston, St. Vincent.

Tongue oval, slightly nicked behind. Vomerine teeth in two short, slightly arched series behind the choanae. Snout short, as long as the eye, blunt, canthus depressed, rounded, nostril nearer to the tip than to the eye. Interorbital space near the width of the supraorbital. Tympan-

num nearly three-fourths as wide as the eye. A glandular fold above the tympanum; another behind the angle of the mouth. Digits slightly swollen at the tips; fingers moderate, first a little longer than second; toes slender, with a narrow fringe; outer metatarsal tubercle small and indistinct; articular tubercles well developed. When turned forward the tibio-tarsal articulation reaches the eye. Skin smooth; no folds on the flanks. The hinder part of the body bears numerous very small papillæ, in cases scattered over the whole body. Ventral fold indistinct or absent. Male with an internal subgular vocal sac, and two strong conical tubercles on the inside of the first digit.

Brown; a whitish band across the supraorbitals on the forehead; a dark blotch from the orbits to an ashy spot on the middle of the back; with dark spots or cloudings on the hinder portion of the back, on the flanks and on the sides of the limbs. Legs, feet and digits with transverse bands of brown. Belly whitish; chin and throat mottled with brown, becoming dark in males. A white streak from the eye to the angle of the mouth, another below the eye, another down the end of the snout, and two others between the latter and the eye. These streaks become obsolete on very dark colored specimens; that from the eye is often continued to the shoulder where it meets a white mark around the arm. The minute papillæ are usually light-colored and often are surmounted by a black tip.

A male measures in length of body one and five-eighths inches and in leg two and three-eighths; a female is one and three-fourths in body and two and a half inches in length of leg.

BUFO MARINIS L.; *Schneid.*

Trinidad; Grenada; Barbadoes; St. Lucia; St. Kitts; Martinique; Nevis; Montserrat; Jamaica.

At Nevis it was said that these toads had recently been introduced from Barbadoes because it was thought they were hostile to rats.

BUFO PELTOCEPHALUS (Bibr.) *Tschudi*.

Cuba.

BUFO GUTTUROSUS *Gthr.*

Port au Prince, Hayti; Cuba; Bayamon, Porto Rico.

A very young one resembles small specimens of *B. lentiginosus*. It has transverse blotches of brown on legs and arms. On each side of the middle on the back there is a series of rounded brown spots, four or five, each containing a red wart. Each lip has several spots, one below the eye.

HYLA SEPTENTRIONALIS *Tschudi*; *Blgr.*

Bahamas; Cuba.

At Havana on the thirtieth of December the writer took a large number of young ones: larvæ with hind legs, small specimens with the remnant of the tail, and others twice the size of the latter to the adult.

HYLA INSULSA *Cope*; *Blgr.*

Cuba.

HYLA DOMINICENSIS (Bibr.) *Tschudi*; *Blgr.*

Puerto Plata, San Domingo; Isle des Vaches.

HYLA OVATA *Cope*; *Blgr.*

Jeremie, Hayti.

HYLA PULCHRILINEATA *Cope*.

Puerto Plata, San Domingo.

HYLA PARDALIS *Spix.*

Trinidad.

ON WEST INDIAN GECKONIDÆ AND ANGUIDÆ.

BY SAMUEL GARMAN.

GONATODES VITTATUS (*Wieg.*) *Licht.*; *Blgr.*

The females are grey, with scattered spots or with cloudings of brown. There are faint indications of a light vertebral line, but it is very indistinct and has not the black edges present in the males. The ventral surface is light-colored, without the steel blue markings of the belly or the black bars of the throat on the other sex.

Very young specimens are grey, flecked with white spots. These spots form eight or ten transverse series in which each of the larger spots is margined in front by a brownish blotch. The spots also form longitudinal rows, one of them lying at each side of the faintly defined vertebral band.

The eggs are elliptical in longitudinal section, the long axis being five and the short about four sixteenths of an inch.

Twenty-three specimens and a number of eggs were taken at Port of Spain, Trinidad.

THECADACTYLUS RAPICAUDA *Houtt.*; *Gray.*

Trinidad, Grenada, St. Lucia, Dominica, Guadaloupe, Saba, St. Barts and Anguilla are represented in the collection.

Those from Saba and Dominica are darkest in colors; those from Grenada are rather light; and those from Trinidad are reddish in ground color with the brown bands much more distinct.

HEMIDACTYLUS MABOUIA Mor.; D. & B.

Specimens are at hand from Trinidad, St. Lucia, Petit Martinique, Martinique and Porto Rico.

Those from Trinidad are very rough with trihedral tubercles, and the latter are more numerous than on those from the other islands. The nearest approach is in specimens from Porto Rico, but on the mainland those from Para and Rio Janeiro are still more closely allied.

ARISTELLIGER PRÆSIGNIS Hallow.; Cope.

Grand Cayman.

ARISTELLIGER LAR Cope.

A single individual, the type, in the collection.
Jeremie, Hayti.

SPIRERODACTYLUS ELEGANS (McLeay) Reinh. & Lütk.

Of three specimens from Remedios, Cuba, each has eleven transverse bands between the eyes and the base of the tail; another has but ten. One from Caibarien, Cuba, has eleven.

SPIRERODACTYLUS NIGROPUNCTATUS Gray, 1844.

A specimen from Samana, San Domingo, is referred to this species with some hesitation. The scales of the back and of the flanks are keeled; the latter and those of the belly are the larger; those of the head are very small. It is closely sprinkled with small spots of brown, in longitudinal rows.

SPIRERODACTYLUS ALOPEX Cope, 1861.

The types are freckled somewhat by scattered small spots of light color, each occupying one or two scales.
Jeremie, Hayti.

SPILERODACTYLUS PUNCTATISSIMUS D. & B.; Gray.

A couple of specimens from Caibarien, Cuba, have narrow longitudinal streaks of brown, as figured by Cocteau, Rept. Cuba, pl. 18; a third is nearly uniform grey; and a fourth is thickly sprinkled with white dots.

SPILERODACTYLUS PICTURATUS sp. n.

Snout pointed, elongate, about one-half longer than the distance between the eye and the ear, or one and one-half times the orbital diameter. Ear-opening oval, oblique, as large as the digital expansions. Rostral large, with a median cleft at the upper edge; nostril between rostral first labial and three scales; four upper and four lower labials, anterior lower as long as the first two of the upper; mental large, meeting a pair of rounded small scales between the first pair of lower labials. Upper eyelid with a small, spine-like scale. Head covered with keeled, granular scales, larger along the median line and toward the rostral. Dorsal scales strongly keeled, imbricate, very large, largest about twice the diameter of the ventrals, in eight or nine series at each side of two or more vertebral series of granules; gular granules very small, larger toward the mental; ventrals moderate, imbricate, smooth; caudal scales imbricate, hinder margin rounded, anterior keeled, inferior a series of transverse plates.

Brownish. The head is marked with white in a narrow streak on each side from the rostral on the canthus and over the supraorbitals to the back of the head, in a median streak on the forehead, a rounded spot above each ear, another on the occiput and an oblique streak behind each ear upward to the back of the neck. A broad, black band crosses the back just in front of the shoulders, and

in it on each side there are two to three large, white spots; a similar band with spots crosses the middle of the body, and on each side of this band there is another of like pattern but lighter color. Backward on the tail the bands are less regular. On the young the four bands on the body are black. The limbs, lower surface of the tail, chin and cheeks are spotted with brown. The ventrals are lighter, punctulate with dark. On some in the brownish spaces between the dark bands light scales alternate with darker ones.

Possibly this species may prove identical with the *Sphaerodactylus anthracinus* of Boulenger, 1885, from San Domingo; it appears, however, to be quite distinct from the *S. anthracinus* of Cope, 1861, from Mexico. It is most closely allied to the *S. fantasticus* of Dumeril and Bibron from Martinique and to the *S. pictus* from St. Kitts. Our specimens were obtained in western Hayti.

SPHAERODACTYLUS PICTUS sp. n.

Snout blunt, not as long as the distance from the eye to the ear opening, less than one and a half times the diameter of the orbit. Rostral large, with a median cleft above. Nostril surrounded by the rostral, first labial, nasal and an internasal. Three to four labials; lower labials three to four, anterior long. Mental large, truncate posteriorly. A small, spine-like scale on the upper eyelid. Head covered with granular keeled scales, larger toward the snout. Scales of the body moderate, keeled on back and flanks; those of the belly larger. A couple of rows of granules separate the keeled scales above the vertebrae.

Greyish with three or four rows of brown spots on each side. On the snout there is a brown band from each eye

around the end; a median band meets these on the rostral. Behind the eyes, on the head, there are six longitudinal bands of brown, four of which join to form two on the occiput, and these meet the laterals on the neck forming two which are continued above the shoulders. A light line across the forehead from one orbit to the other. Two or three light streaks, across the back of the head and the neck, appear on some. On a very young one there are five narrow, transverse, dark-edged streaks of white between the eyes and the base of the tail. There are traces of brown blotches on the lower surface.

An egg with the specimens has a long diameter of one-third of an inch and a short one of one-fourth.

Hab. St. Christopher's.

SPHERODACTYLUS MACROLEPIS *Gthr.*, 1859.

There is some resemblance in marks between specimens from St. Thomas and *S. pictus* from St. Kitts; the latter have the vertebral series of granules, as in *S. Copii*.

An egg which apparently belonged to one of the specimens measures in its longer diameter one-fourth of an inch and in its shorter one-fifth.

From San Domingo, Porto Rico and St. Thomas.

ANGUIDÆ.

DIPLOGLOSSUS STRIATUS *Gray; Blgr.*

Careful study of the type of *D. stenurus* Cope convinces me that Dr. Boulenger is right in placing it in *D. striatus*.

The lateral teeth of the specimen are two-cusped, the posterior cusp being much the stronger. The tail is slen-

der, compressed and about one and two-thirds times the length of the body. The tips of toes and fingers overlap slightly when the limbs are pressed to the side.

Jeremie, Hayti.

DIPLOGLOSSUS CRUSCULUS sp. n.

Lateral teeth compressed, bicuspid, anterior cusp small or indistinct. Ear-opening as large as the eye-opening, oblong, vertical. A large azygos prefrontal, broader than long, in contact with the broadest loreal, little wider than the frontal, separated by two pairs of shields from the rostral; occipital smaller than the interparietal; nasal separated from the rostral by the first labial; a postnasal and two or three loreals, second broadest; the suture between the fifth and sixth or sixth and seventh labials falls below the middle of the eye. Submentals large, one anterior followed by four pairs, anterior three and part of fourth in contact with the lower labials. Body elongate, sub-round, depressed. Forty-two rows of scales around the middle of the body; dorsals slightly roof-shaped, finely striate, with twenty-one striae on the middle of the back. Limbs short and weak; fingers not four times as long as thick; arm to the end of fingers reaching the anterior border of the ear; adpressed limbs not meeting by the length of the arm and hand; foot and leg two and one-third times in the distance from arm-pit to thigh.

Back brownish with closely placed narrow transverse or reticulated lines of brown; a narrow, light-edged dark streak along the upper edge of each flank, edges serrated; flank with scattered spots of white, less than a scale in size; darker lateral edges of scales under neck and head forming longitudinal streaks. Labials and other shields of the head with brown blotches.

Hab. Kingston, Jamaica.

DIPLOGLOSSUS COSTATUS.

Panolopus costatus Cope, 1861, Pr. Phil. Ac., 494.

Celestus phoxinus Cope, 1868, Pr. Phil. Ac., 123, 125.

Examination of the specimen that served as the type in founding the genus *Panolopus* shows that it had suffered considerably from mutilation, being deprived of its fingers and toes and badly wounded in the fore part of the head. In shape it is elongate fusiform, with a sharpness of angles on head and body that is in great part due to emaciation.

The arms and wrists are normal. The fingers have been carried away; this is proved by the differences in the stumps of hands and in the forms and sizes of the scales and callosities covering the healed surfaces. More of the hand remains on the right side than on the left; on the latter the extremity is more nearly conical; on the former it is more broad and flattened.

The legs and ankles also are normal. Excepting a short stump of each inner toe, the toes have been lost and with them a portion of each foot. The left stump is the more pointed. The callosities and scales covering the wounded portions are very different in shapes, sizes, numbers and arrangement on the two feet. Each foot is marked as if from unsuccessful attempts to cut it off nearer the ankle.

In front of the left eye there is a deep scar; a much deeper one is seen behind the second submental shields on the chin; and shallower evidence of healed wounds exists on the snout about and in front of the nostrils. A consequence of these wounds appears in the more or less complete fusion of rostral, nasals, supranasals, postnasals and the anterior three of the labials. The fusion is not entire; here and there portions of the dividing lines re-

main, and these with lines that appear through the scales, when out of alcohol for a short time, prove that the original disposition of the plates was much as in *D. occiduus*.

There are forty-four series of scales around the body. The coloration is as in *D. phoxinus*, except that the brown of the flanks is lighter, and that the small brown spots on the dorsal region are more numerous and a little more irregularly distributed.

The specimens from which the foregoing notices have been drawn belong to the Museum of Comparative Zoölogy at Cambridge, Mass.

ON WEST INDIAN REPTILES.

IGUANIDÆ.

BY SAMUEL GARMAN.

THIS notice contains a list of the species of Iguanidæ at present represented in the Museum of Comparative Zoology, at Cambridge, Mass., with localities and notes, and with descriptions of such as are new or little known. It includes a tolerable proportion of all the species hitherto recognized as belonging to this region, together with quite a number that do not appear to have been described. The list was prepared some years ago, but, owing to uncertainty in regard to some of the species discovered in the early part of the century, the types being inaccessible and the descriptions insufficient, it was laid aside until it might be put into more satisfactory shape. The splendid catalogues of Doctor Boulenger, recently published, have made it possible to identify with confidence many species which previously were, in the absence of typical specimens, only conjectural. The Doctor's classification has been followed pretty closely in the main; the departures made are principally due to differences of opinion concerning names adopted or the relative rank of certain forms. In answer to objections that may be urged against bringing varieties as prominently forward as is usual with species, it may be said that the nature of the case seems to demand it; abrupt separation and isolation on the different islands and consequent absence of gradual shading of the varieties, one into another, appear to entitle them to more prominence.

Unless otherwise specified the collections were made by the writer.

XIPHOCERCUS VALENCIENNI Dum. *Bibr.*, 1837.

A female has transverse bands of light brown on the limbs, a band across the neck, another immediately behind the shoulders and another in front of the thighs on the flanks; the tail is ringed with brownish; between the eye and the ear on each side of the head there is a quadrangular space enclosed by four short narrow lines of brown; a streak of light color extends from the loreal region beneath the eye to the angle of the mouth; the gular fold is purple with a creamy border; the lips are black; the upper and the lower surface of the head are whitish; there are short, narrow longitudinal streaks of brown arranged in transverse series on the flanks; and along the median line of the back there are several small, transverse blotches of brownish, with others of light color.

On a young one, less than an inch in length of body, the markings are similar though much lighter; a light brown band crosses the supraoculars and passes downward through the eye across the lips; vertical lines of brown cross both lips in front of the eyes; the gular fold is of a pink tint. In this little one the goitre is comparatively large, although the short snout, not longer than the orbit, convex on the upper surface, the disproportionate size of the eye and the bulged, swollen appearance of the parietal region indicate that it had been but a short time out of the egg.

Kingston, Jamaica.

ANOLIS EQUESTRIS Merrem, 1820.

There are five large specimens in the collection which are referred to this species. One of the lot is said to

come from Bahia, and, on examination of more individuals from the same locality, it may be found necessary to give a different specific name. It does not entirely agree with the others in shape in front of the eyes, where the rostral canthus curves outward more, making a broader snout. It differs to some extent in the squamation of the top of the head, but the scales are so confused it is difficult to discover the lines of separation. The number of lamellæ appears about the same as in the others.

Cuba; Bahia. ? Coll.

ANOLIS RICORDII Dum. *Bibr.*, 1837.

On a female from Samana, San Domingo, all of the supraoculars are keeled; the occipital scale is very small, hardly larger than the surrounding granules, but marked by the white spot in the centre; the color is a grayish brown, the light-colored transverse bands being sprinkled with brown scales and the brown spaces with lighter ones. Collected by M. A. Frazar.

ANOLIS CUVIERI Merr., 1820.

A large specimen, presented by Dr. Aug. Stahl, of Porto Rico, is of a uniform bluish color, without the brown spots on the vertebral line; it is tinted with yellow beneath; the gular fold is yellow; and the frontal region and a streak from the loreal region beneath the eyes are whitish.

ANOLIS GUNDLACHI *Ptrs.*, 1876.

Young specimens have a vertebral band of yellowish color.

From Dr. Aug. Stahl, Porto Rico.

ANOLIS CRISTATELLUS Dum. *Bibr.*, 1837.

Collected by Professor Ackerman, Port au Prince, Hayti; Dr. D. F. Weinland, Jeremie, Hayti; J. A. Al-

len, St. Thomas; and S. Garman, Bayamon, Porto Rico, Morant Island and St. Thomas.

ANOLIS SCRIPTUS sp. n.

Head moderate, about one and three-fourths times as long as broad, nearly one and a half times the length of the tibia, with flat crown, very slightly concave on the forehead and on the occiput; frontal ridges low, diverging anteriorly; with three large blunt-keeled scales; upper head scales with low keels; scales of the supraorbital semicircles large, in contact on the median line, or separated by a single row of small scales, continued as the frontal series; seven to nine enlarged, feebly-keeled supraoculars, separated from the supraorbitals by a single row of granules; occipital as large as the ear opening, separated from the supraorbitals by three or four series; rostral canthus sharp, of four scales; loreal rows four to six; six or seven labials to below the middle of the eye. Gular appendage moderate, smooth scaled. Body very little compressed, with a low dorso-nuchal fold. In the female, the goitre forms a low, longitudinal fold without the fan-like lobe. All scales obtusely keeled; dorsal and lateral granular, becoming larger toward a couple of rows of enlarged scales on the vertebral fold; ventrals larger than the dorsals, little smaller than the antefemorals, imbricate, with rounded posterior margins and feeble keels. Limbs moderate, the adpressed hind limb reaches the eye; digital expansions medium, twenty-two under phalanges ii and iii of the fourth toe. Tail compressed, slender posteriorly, more than twice the length of the body and head, with a sharp crest of unequal scales. On the male the neural spines support a fin-like expansion extending not more than half the length. Enlarged post-anal scales.

Gray, greenish, bluish, or brownish, bronzed, with or without spots or vermiculations of brown on nape, flanks,

chin and limbs; lips with or without brown spots. A young one has a large, rounded white-edged spot of brown above each shoulder; on another these spots are obsolete.

Readily distinguished from *A. cristatellus*, which it closely resembles, by the greater size of the two vertebral rows.

From Professor L. Agassiz; Silver and Lena Keys, Fla.

ANOLIS STRIATULUS Cope, 1861.

From Professor Ackerman, Port au Prince, Hayti; Dr. Aug. Stahl, Porto Rico; Hassler Expedition, St. Thomas.

ANOLIS GINGIVINUS Cope, 1864.

Dr. W. J. Branch, Anguilla Island.

ANOLIS BIMACULATA, Sparrman sp.

These notes are taken from forty-six specimens secured on St. Kitts. The species is usually confounded with several others to which it is somewhat closely allied. It is distinguished by the size of its granules, the four to five loreal series, the broad smooth plates in front of the thigh, the meeting of the opposite supraorbital series on the forehead, in seven specimens of each eight, and by the coloration.

The color is blue or green, grayish to brownish; white beneath. Posteriorly, on the flanks and on the tail, usually there are present a number of small spots of black, irregularly scattered but often forming a rounded bunch in front of the thigh on the side of the abdomen. Above the axilla there is most often a rounded black spot. Rarely it is continued forward as a band to the angle of the mouth. From the upper labials there is a light band crossing the upper half of the ear to end on the flank above the shoulder.

Above and in front of the shoulder, below the dark spot, there is another band of light color, and there are faint indications of a third from each side of the occiput to the nape. The lips are yellowish; generally each bears a series of dark spots, more or less numerous. Commonly the head, from the hinder edge of the orbits forward above the labials, is dark brown. The throat and neck are in cases clouded by darker. The prominent marks are the black spots above the axilla, the white patch in front of the shoulder, the dark mark behind the ear, and the small black specks. None of these specimens have series of ocellate spots on the flanks. We have specimens of this lizard from Nevis, also, where it is the "Blue lizard"; this raises the question as to the identity of Merrem's species with Edwards' lizard from Jamaica.

ANOLIS OCULATUS, sp. *Cope*, 1879.

At several points on Dominica a lot of eighty-one specimens was gathered. From them it is evident that the species should not be united with *A. bimaculatus* of Sparrman, although they discover a considerable amount of variation. In color they range from light grey to nearly uniform dark brown. On the majority the white marks form transverse series of six to eight spots each. A spot near the middle of the flank in each series is larger and more distinct than the others; in this way a longitudinal row is formed on each side which persists on specimens from which the transverse series have faded. In cases there is a short white line from the shoulder backward; occasionally there is also a second, parallel to the first, separated from it by a dark space. Above the shoulder, and a little backward, there is usually a dark spot including one of the white ones, often including a white one in each side of it, and behind this a short distance another,

the latter frequently followed by a third or a series. Some are freckled by white specks on body and tail. Many have dark spots on the upper edge of the tail. The bluish white spot on the occipital scale is always present.

The females are not so much spotted as the males and such marks as they have appear to be less distinct.

This species is separated from *A. bimaculatus* by its smaller scales, by the sharp keel on the largest scales in front of the thigh, by the greater number of loreal series, by the separation of the supraorbital series on the forehead, and by the coloration. It has six to eight loreal series and the supraorbitals are separated by one to three series of granules in seven of each eight individuals. There are about twenty-three lamellæ under phalanges ii and iii of the fourth toe. This may be one of the two species *A. maculatus* described by Dr. Gray, but it is not to be determined from his description.

Hab. Dominica.

ANOLIS ASPER, sp. n.

Head moderate, one and a half to one and two-thirds times as long as broad, longer than the tibia, crown flattened, cheeks swollen in the males; snout rather broad; forehead to occiput concave; frontal ridges low; upper head scales not keeled; scales of the supraorbital semi-circles broad, three pairs in contact on the median line, usually separated from the occipital scale, which is about the size of the ear-opening, by one to two rows; seven or eight indistinctly keeled supraoculars, smooth in young, most often in contact with the supraorbitals; rostral canthus sharp, straight, canthal scales three to four; loreal rows three to four; six labials to below the centre of the eye; ear opening rather small, vertically elongate. Gular fold moderate, small on the female; with smooth scales. Body

little compressed, male with a dorso-nuchal fold. Dorsal scales small, granular, keeled, rough to the touch, larger on the back than on the flanks; ventrals larger than dorsals, smooth under the abdomen; antefemorals larger than ventrals, keeled. The scales have a swollen appearance, and on the larger specimens might be described as sub-conical; this is especially marked near the occiput and among the larger ones of vertebral rows. The adpressed hind limb reaches the eye; digital expansions large; the lamellæ under phalanges ii and iii of the fourth toe number about thirty. Male with enlarged post-anal scales. Tail compressed, not twice as long as head and body, with a serrated upper edge, which in the male is borne on a broad fin-like expansion.

Greenish or olivaceous to reddish brown or grayish on the back and flanks, with or without cloudings of darker; forehead often darker; ventral surface lighter to whitish.

A series of more than thirty specimens was purchased from Mr. W. B. Richardson who secured them on the island Marie Galante.

Closely allied to *A. ferreus*, Cope, from Guadaloupe; distinguished by small lateral scales, three pairs of supra-orbitals in contact between the orbits, three to four loreal rows, etc.

ANOLIS MARMORATUS Dum. Bibr., 1837.

As has been remarked by Dr. Boulenger, this species is closely allied to *A. bimaculatus*. The principal distinction lies in the coloration. The average size of our specimens is much less; and apparently the snout is a trifle more pointed, with canthus and ridges sharper.

Hab. Desirade. W. B. Richardson, 52 ex.

ANOLIS NUBILUS, sp. n.

Head large, somewhat similar in shape to that of *A.*

cristatellus, but longer and more pointed at the snout; cheeks and parietal regions swollen, about one and two-thirds times as long as broad, much longer than the tibia; forehead and occiput slightly concave; frontal ridges distinct, but not high; upper head scales not keeled; scales of the supra-orbital semicircles large, more or less in contact on the median line; eight to twelve enlarged faintly keeled supraoculars, separated from the supraorbitals by a single series; occipital as large as the ear, separated from the supraorbitals by two or three series of granular scales; canthus rostralis sharp, prominent, of three scales; loreal rows four to five; six to seven labials to below the centre of the eye; ear opening moderate, subelliptical, higher than long. Gular appendage medium, small in the female, smooth scaled. Body compressed; dorso-nuchal fold distinct. Dorsal scales small, keeled, larger in a couple of rows on the dorsal fold; smaller on flanks; scales of belly larger, smooth, imbricate, posterior margin rounded; antefemorals still larger, keeled, five or six near the knee about twice as broad as long, with several keels. Limbs moderate, the adpressed hind limb reaches the eye; digital expansions rather large, lamellæ under phalanges ii and iii of the fourth toe about twenty-eight. Tail compressed, with a low crest of subequal compressed scales, one of each four being a trifle larger and marking the segments, less than twice as long as head and body. Male with enlarged post-anal scales.

Grayish olive to olivaceous or reddish brown, with or without specks of light color on flanks and legs. With indistinct cloudings of darker, forming transverse bands on the tail and frequently also on the body. Ventral surface whitish; throat, at sides of the gular fold, darker.

Hab. Redonda. W. B. Richardson.

ANOLIS CEPEDII Merrem, 1820.

St. Pierre, Ft. de France, and Morne Rouge, Martinique. Seventy-four specimens.

ANOLIS GENTILIS, var. n.

Head moderate, about one and two-thirds times as long as broad, longer than the tibia; forehead with very little concavity; frontal ridges low; upper head scales smooth; scales in the supraorbital semicircles enlarged, the anterior one in each as large as three of the other four, the anterior four of each series in contact with the opposite four, and the hinder pair of each in contact with the enlarged occipital; the scales forward from the largest supraorbital rather small; internarials narrow, elongate; nine to fourteen enlarged feebly keeled supraoculars; canthus rostralis angular, canthal scales five or six; loreal rows four, rarely five; six or seven labials to below the centre of the eye. Ear opening half as large as the occipital scale, vertically oblong. Gular appendage moderate, covered with smooth scales. A low dorso-nuchal fold. Dorsal scales keeled, small, larger in two or more of the vertebral rows, smaller on the flanks; ventrals still larger than the dorsals, smooth; antefemorals larger than the ventrals, keeled. The adpressed hind limb hardly reaches the orbit; digital expansions larger than the average, twenty-two lamellæ under phalanges ii and iii of fourth toe. Male with a pair of enlarged post-anal scales. Tail compressed, twice as long as head and body; a dorsal series of large compressed subequal scales forms a crest; ventral series large, and strongly keeled in the two median rows.

Light grayish brown, with greenish, yellowish, or metallic tints; whitish beneath; with five to seven broad transverse badly defined bands of brownish between the head and the tail; legs and arms with similar bands; body

freckled or clouded with faint small blotches of brown and occasionally a few black spots. Tail ringed with broad bands and head clouded with brownish. A very young specimen has a dark edged vertebral band of light color which is not crossed by the transverse marks.

This variety of *A. cepedii* is known from twenty-five specimens taken by the writer on Petit Martinique, one of the Grenadines.

ANOLIS CINEREUS, var. n.

This variety of *A. cepedii* differs from *A. trinitatis* in being more olive or bluish; the legs show more of the lilac color, and, on our specimens, the transverse bands are obsolete. The color is intermediate between that of light-grayish varieties, from Trinidad and Petit Martinique, and the brownish, from Barbadoes.

Hab. Grenada. Twenty-four specimens.

ANOLIS TRINITATIS Reinh. & Lützk., 1862.

This form has a lighter, more grayish color than the other varieties of *A. cepedii*, and in consequence the transverse bands and the small black or brown spots are more distinct.

Hab. Trinidad. Twenty-five examples, C. S. Cazon and S. Garman.

ANOLIS EXTREMUS, var. n.

Head moderate, more than one and a half times as long as wide, much longer than the tibia; forehead and occiput concave, deeply so in old specimens; frontal ridges prominent, diverging; snout about one and a half times the length of the space between eye and ear; upper head scales more or less rough; scales of the supraorbital semicircles large, three or four pairs in contact across the interorbital space, anterior one of each series very large.

preceded by small ones in the frontal rows; ten to twelve enlarged, keeled supraoculars, separated by two series of granules from the supraorbitals; occipital larger than the ear, elongate, in contact with the supraorbitals; rostral canthus distinct, of one long and three smaller scales; loreal rows four to five; five to six labials to below the centre of the eye; ear opening moderate, vertical diameter longest. Gular appendage large, smooth scaled. Body compressed; a dorso-nuchal fold, surmounted by two rows of slightly enlarged carinate scales. Dorsal scales small, keeled, subhexagonal, smaller on the flanks. Ventrals little larger than the vertebrals, smooth, imbricate, posterior borders rounded; antefemorals larger, faintly keeled, one or two rows near the knee tricarinate. Adpressed, the hind limb hardly reaches in front of the ear; digital expansions moderately large; lamellæ under phalanges ii and iii of the fourth toe about twenty-seven. Tail slightly compressed, with a low crest of broad, keeled, subequal scales. No enlarged post-anal scales.

Grayish-brown to brown or to olive; with transverse bands which pass obliquely backward down the flank, sometimes separated by lines of small, white spots, and in cases the posterior margins are whitish. Belly white, tinged with olive toward flank and thorax; throat brown at side of goitre, often clouded under the chin.

Young, rusty brown, with transverse bands on back, tail and limbs; frequently a vertebral series of black spots, each of which is white-edged posteriorly.

Hab. Barbadoes. A variety of *A. cepedii*. Thirty specimens, Hassler expedition and S. Garman.

ANOLIS GRISEUS, sp. n.

Head large, one and two-thirds to one and three-fourths times as long as broad, shaped like that of *A. cepedii*,

medium to large specimens with three pairs of ridges on the top, concave on forehead and occiput, longer than the tibia; snout depressed; prefrontal ridges low, forming an acute angle between the nostrils, not meeting the supraorbitals; upper head scales rough; scales of the supraorbital semicircles enlarged, separated from each other by two (one to three) series and from the occipital by one series of small scales; occipital twice as large as the ear opening; eight to twelve enlarged, keeled supraoculars, separated from the supraorbitals by one row of granules; rostral canthus sharp, of four scales; loreal rows four to five; five to six labials to below the centre of the eye; ear opening small, vertical diameter largest. Gular appendages large, smaller in the female, scales indistinctly keeled. A dorso-nuchal fold. Dorsal scales keeled, small, larger at the sides of the two rows of large, compressed, elongate, keeled scales forming the crest on the fold, smaller on the flanks; ventrals carinate, larger than the dorsals, excepting the crest; antefemorals keeled, little larger than the ventrals, if we except a couple of scales immediately on the knee. Limbs long, the adpressed hind leg reaches in front of the eye; digital expansion moderate, about twenty-nine lamellæ under phalanges ii and iii of the fourth toe. Tail compressed, with a crest in which the large scales are nearly equal, close upon two and a half times as long as both head and body.

Grayish to brownish or olivaceous, clouded, freckled, or spotted with brown and white. Sometimes with a few rounded spots of black about the shoulders; in such cases the spots are arranged in series which descend backward from the crest. Many have an indistinct brownish band across the shoulders, the middle of the body, the femur and the tibia; they also have bands across the digits and

the tail. Top and sides of head usually dark. Ventral surface whitish.

Hab. St. Vincent. Twelve specimens.

ANOLIS TROSSULUS, sp. n.

Head rather large, about one and two-thirds times as long as wide, as long as the tibia; snout moderately broad, one and a half times as long as the distance from eye to ear; forehead and occiput concave, deeply so in large specimens; frontal ridges low, short; some of the upper head scales keeled; scales of the supraorbital semicircles large, partly in contact or entirely separated between the orbits; nine to fifteen enlarged, keeled supraoculars, in contact with or separated from the supraorbital semicircles; occipital larger than the ear opening, in a cup-shaped depression, in contact with or separated from the supraorbitals; rostral canthus angular, canthal scales two large and two small; loreal rows five (four to six); five to six labials to below the centre of the eye; ear opening medium, vertical diameter twice the longitudinal. Granules on the swellings behind the occipital very small. Gular appendage large, extending backward of the arms, its scales small, keeled. Body compressed; dorso-nuchal fold surmounted by two rows of enlarged, strongly-carinate scales. Dorsal granules small, rough to the touch, with strong keels, larger toward the vertebral rows, smaller toward the flanks; ventral scales larger than the dorsals, hexagonal, juxtaposed, strongly keeled; antefemorals larger, imbricate, keeled, tricarinate in two rows near the knee. Limbs strong; adpressed, the hind limb reaches the anterior border of the eye; digital expansions not large; lamellæ under phalanges ii and iii of the fourth toe about twenty-six. Tail compressed, near two and a half

times as long as head and body, crested above by large subequal strongly keeled scales; no fin-like expansion. Post-anal scales not enlarged. Total length of large specimen fourteen inches.

Reddish-brown to light-grayish or bluish; tail with faintly indicated transverse bands of brown; head darker, frequently with white spots on the supraorbitals or on the back of the head; chin and lips white to brownish, blotched or clouded with dark. Ventral surface whitish, tinted with blue or olive toward the flanks. Young with a brownish-vertebral band and limbs freckled with small spots of lighter or darker.

Hab. Grenada. Sixteen specimens.

ANOLIS GRAHAMII Gray, 1845.

This lizard was found to be very numerous in the neighborhood of Kingston, Jamaica.

ANOLIS CONSPERSUS Garman, 1887, Pr. Am. Phil. Soc.

The specimens from which this species was described, eighty-seven in number, were collected on the island Grand Cayman by Mr. W. B. Richardson.

ANOLIS SABANUS, sp. n.

Head moderate, about one and three-fourths times as long as broad, longer than the tibia; snout broad; cheeks but little swollen in the male; forehead and occiput concave, former with two distinct ridges. Upper head scales smooth; scales of the supraorbital semicircles large, anterior twice as long as wide, in contact between the orbits, rarely separated by a single row of granules, continued forwards, in the frontal series, decreasing in size, to the nostrils; eight to eleven enlarged feebly keeled supraocular scales, separated by a single series of granules from the supraorbitals; occipital as large as or larger than the

ear-opening, separated from the supraorbital series by one to three rows of small scales; rostral canthus sharp, of four or five scales; loreal rows four to five; six or seven labials to below the centre of the eye. Ear opening moderate, vertical diameter elongate. Gular appendage large in the male, with smooth scales. A low dorso-nuchal fold bearing a couple of rows of larger, blunt keeled scales which increase in size toward the middle of the body. Body slightly compressed. Dorsal scales small, obtusely keeled, larger than those on the flanks, much smaller than the (smooth or faintly keeled) ventrals. The adpressed hind limb reaches the eye; digital expansions moderate, twenty-five lamellæ under phalanges ii and iii of the fourth toe. Tail somewhat compressed, not twice the length of head and body, with unequal-sized scales, which mark the segments; crest low in female, higher in male. All of our specimens are adult, but none bear the fin-like expansion of *Xiphosurus*. Enlarged post-anal scales on the male.

Light grayish or yellowish brown profusely spotted with large spots of black, separated by spaces of equal width, often confluent on the back and behind the head; the three series, or lines, on each side of the head, the median from the eye, converge toward the back of the neck. On the flanks there are three to four rows of spots, arranged in ten or a dozen transverse series, the upper of which are frequently confluent, forming transverse bands. The top and sides of the head are yellowish, and spotted with large black spots. The ventral surface is whitish. On a female the ground color is a little darker and the spots less distinct and more elongate.

Eggs supposed to belong to this species—sent with a lot made up entirely of males—have a leathery envelope and measure in length about five-, and in width about three-tenths of an inch.

— This species has been reported only from the island of Saba, whence thirteen specimens were sent us by Mr. F. Lagois and others.

ANOLIS VIRGATUS, sp. n.

Head rather large, one and two-thirds times as long as broad, much longer than the tibia; forehead hardly concave in adults, frontal ridges distinct, occipital scale in a concavity; upper head scales faintly keeled; scales of the supraorbital semicircles large, continuous forward with the frontal series, in contact or separate mesially; five to ten enlarged feebly keeled supraoculars, partially or entirely separated from the supraorbitals by a single row of granules; rostral canthus angular, of four scales; occipital scales usually larger than the ear-opening, separated from the supraorbital semicircles by one to three series of granular scales; loreal rows five; six or seven labials to below the centre of the eye. Ear-opening small, vertically oblong. Gular appendage medium, covered with smooth scales. No dorso-nuchal fold. Dorsal scales keeled, granular, little larger than those on the flanks, slightly larger at the sides of two enlarged vertebral rows; scales around the occipital and on the parietal prominences larger; ventrals much larger than the largest dorsals, smooth, imbricate; three or more rows of broad, smooth, antefemorals. The adpressed hind limb reaches the eye; digital expansions medium; twenty-three lamellæ under phalanges ii and iii of the fourth toe. Tail compressed; serrated on the upper edge in a crest in which the large scales are separated from each other by a pair each of which is about half as large. Males with a pair of enlarged post anal scales, in contact or separated by a single scale.

Gray; white beneath. On back and flanks there are

numerous longitudinal streaks or elongate spots of dark brown, in cases forming vermiculations; a whitish band extends from the arm above the axilla along the flank to the hinder part of the thigh or the base of the tail; tail with indistinct transverse bands of brownish; back, in cases, with faint cross bands.

The types from which this description is taken are fifteen specimens collected by Mr. F. Lagois on the island St. Bart's.

ANOLIS DISTICHUS Cope, 1861.

About forty specimens are in the collection. They were secured at Jeremie, Hayti, by Dr. Weinland, at Samana and Puerto Plata by M. A. Frazar, and at Isle des Vaches, western Hayti, by the writer.

ANOLIS CYBOTES Cope, 1862.

From Jeremie, Hayti, Dr. Weinland; and Samana, San Domingo, M. A. Frazar.

ANOLIS HAETIANUS, var. n.

A variety of *A. cybotes* which is introduced under this name, from Tiburon, Hayti, has keeled ventral scales and eight to ten rows of loreals. The canthus rostralis is very prominent laterally and makes a curve considerably rounded or convex upward.

ANOLIS CITRINELLUS Cope, 1864.

From Port au Prince, Hayti; Prof. Ackermann.

ANOLIS SPECIOSUS, sp. n.

Head moderate, one and two-thirds to one and three-fourths times as long as wide, longer than the tibia; forehead and occiput slightly concave; frontal ridges low; upper head scales rugose; scales of the supraorbital semi-

circles large, continuous forward as frontal series, most often separated between the orbits by a single series of granules, occasionally in contact; six to twelve enlarged supraocular scales, smooth or with a faint keel, separated from the supraorbitals by a single series of granules, sometimes in contact; occipital about as large as the ear opening, separated from the supraorbitals by two (one to three) series; canthus rostralis distinct, scales three or four, loreal rows four to five; seven to eight labials to below the centre of the eye; parietal granules enlarged, convex; ear opening small, vertically widest. Gular appendage small, scales smooth or faintly keeled. Body slightly compressed, a very low dorso-nuchal fold surmounted by several rows of enlarged keeled granules. Dorsal granules small, a little enlarged at the sides of the dorsal fold. Ventral scales large, imbricate, faintly keeled, posterior margin rounded. Antefemorals larger, with low keels. Limbs moderate, the adpressed hind limb reaches the orbit; digital expansions rather small; about twenty-four lamellæ under phalanges ii and iii of the fourth toe. Tail compressed; with a low crest of large subequal scales, those marking the segments slightly larger; nearly twice the length of head and body. Enlarged post-anal scales.

Body uniform greenish to olivaceous blue, legs and head brownish; lighter beneath, clouded with brownish on the chin, throat and anterior portion of the goitre. No white spots.

A small species, reaching the size of *A. principalis*. Common on Marie Galante, whence our specimens were brought by Mr. W. B. Richardson.

ANOLIS LIVIDUS, sp. n.

Head moderate, one and two-thirds to one and three-fourths times as long as wide, much longer than the tibia; occiput and frontal regions slightly concave; frontal ridges

distinct, low; upper head scales not keeled; scales of the supraorbital semicircles large, continuous forward with the frontal series, usually one of each in contact across the interorbital space; eight to twelve enlarged supraoculars, smooth or with a low tubercle on the centre, separated from the supraorbitals by one series of granules; occipital scale larger than the ear opening, separated from the supraorbitals by one series or more; rostral canthus angular, of four scales; loreal rows five; six labials to below the centre of the eye; ear opening medium, vertical diameter longer. Gular appendage moderate, smooth scaled.

Body little compressed, dorso-nuchal fold slight. Dorsal scales small, granular, keeled, enlarged near the large ones of the median rows; ventrals large, carinate, imbricate, posterior border rounded; antefemoral scales larger than ventrals, keeled. Limbs moderate, adpressed the hind leg reaches the eye; digital expansions rather large; lamellæ under phalanges ii and iii of the fourth toe about twenty-five. Tail compressed, rough, serrated on the upper edge by large scales of which that marking the end of a segment is somewhat larger, less than one and a half times as long as head and body. Male with enlarged post-anal scales.

Blue to olive or brownish; head lighter, yellowish to yellowish brown, a light streak along the upper lip; belly lighter, yellowish posteriorly; legs whitish beneath. The back is uniform or sprinkled with indistinct small spots of whitish on neck and shoulders, rarely on the flanks. Young ones are light grayish and have a dark-edged vertebral band of light color, which is sometimes crossed by hour-glass-shaped transverse bands of brown.

Hab. Montserrat. Fifty-three specimens.

ANOLIS LUCLE, sp. n.

Head longer than the tibia, one and three-fourths times

as long as broad ; snout depressed, twice as long as the distance from orbit to ear ; forehead and occiput deeply concave ; frontal ridges distinct, having the appearance of dividing into two or three anteriorly ; a few only of the upper head scales keeled ; scales of the supraorbital semicircles large, not separated between the orbits ; eight to twelve enlarged, smooth to feebly keeled supraocular scales, in contact with or separated from the supraorbitals, by a single series ; occipital about twice as large as the ear opening, in contact with the supraorbitals ; rostral canthus not prominent, of five scales ; loreal rows four to five ; six to seven labials to below the centre of the eye ; ear opening small, twice as high as long. On large specimens the supraorbital ridges become very prominent and continued backward enclose a cup-shaped depression on the occiput ; the parietal granules are greatly enlarged. A couple of rows of much enlarged granules extend back from the orbit and bend down toward the ear. Gular appendage moderate, smooth scaled. Body hardly compressed, dorsonuchal fold indistinct, marked by a couple of rows of enlarged keeled scales. Dorsal scales small, very irregular in sizes, six or eight rows of the vertebrales enlarged and keeled, those on the flank smaller. Ventrals larger, subhexagonal, juxtaposed, smooth. Limbs medium ; adpressed, the hind leg reaches a little in front of the ear ; digital expansions moderate ; lamellæ under phalanges ii and iii of the fourth toe about twenty-seven. Tail feebly compressed, nearly twice as long as head and body, serrated on the upper edge with low subequal strongly keeled scales. No enlarged post-anal scales.

Grayish to brownish olive, with or without faint transverse bands of brown on the anterior portion of the body and on the tail ; more blue on the flanks and beneath ; head darker. On back and flanks there are indistinct traces of

vermiculations in light iridescent tints. On young ones there are five transverse bands on the body; these individuals are more gray, or brown, than the large.

Hab. St. Lucia. Thirty-three specimens.

ANOLIS VINCENTII, sp. n.

Head of medium size, about one and three-fourths times as long as wide, longer than the tibia, deeply concave on the forehead and occiput, slightly depressed on the snout; frontal ridges distinct, not extending forward, prominent and rough between the orbits in adults; upper head scales not keeled; scales of the supraorbital semicircles large, more or less in contact between the orbits; nine to fourteen enlarged keeled supraoculars, separated from the supraorbital series by a series of granules; occipital twice as large as the ear-opening, anterior border rounded, in contact with the supraoculars; canthus rostralis not very distinct, of two large and two or three short scales; loreal rows five to six; seven to eight labials to below the centre of the eye; ear opening hardly half as large as the occipital, vertically oval. Gular appendage large, reaching behind the thorax, scales smooth. Body little compressed; a slight dorso-nuchal fold. Dorsal scales small, keeled, increasing in size toward the two mesial rows which are largest. Ventral scales smooth, subhexagonal, hardly imbricate, smaller than a few of the antefemorals; the latter moderate, keeled, near the knee tricarinate. Limbs medium, the adpressed leg reaches the ear; digital expansions not large; lamellæ under phalanges ii and iii of the fourth toe about twenty-six. Tail compressed, serrated on the upper edge by large, sub-equal, pointed scales, more than twice (two and one-fourth times) as long as head and body. Postanals not enlarged.

Green to brownish olive; flanks, sacral region, limbs and tail more or less purple or lilac in life; ventral surfaces whitish; gular fold darker, anteriorly, as also in cases, the lower surface of the neck. Head most often darker; upper lip frequently whitish. Very young ones are bronzed, light reddish brown, with faint transverse bands and cloudings; white beneath.

Hab. St. Vincent; eighty-seven specimens.

ANOLIS LINEATOPUS Gray, 1840.

On very young specimens there are four vertical bands of brownish on the flank, sometimes more or less subdivided, and from each a sharp angle is presented to one from the opposite flank, meeting at the vertebral series.

Hab. Kingston, Jamaica. Twenty-five specimens.

ANOLIS SAGRAE (Coct.) Dum. Bibr., 1837.

From Cuba, 5 ex., S. H. Scudder; 7 ex. Caibarien, Cuba, N. H. Bishop; 60 ex., Matanzas, Havana, and Bahia Honda, Cuba, S. Garman.

ANOLIS ORDINATUS Cope, 1864.

We have this variety of *A. sagrae* from the Bahamas, by C. J. Maynard; New Providence, Bahamas, by F. K. Shaw; the Florida Keys by Count L. F. de Pourtales; and from Nassau, Bahamas, by J. C. Comstock.

ANOLIS PORCATUS Gray, 1840.

This *Anolis* is usually confounded with the *A. principalis* Linné, from the southern part of the United States. The species are in reality quite distinct, though bearing considerable resemblance to each other. Compared with representatives of *A. principalis* from the Carolinas, *A. porcatus* has a longer snout, stronger and sharper cephalic ridges, a longer tail, longer legs, more digital lamellæ and

larger scales on the loreal region and on the flanks. The snout is twice the length of the space between the orbit and the ear; the frontal ridges are very prominent, sharp and comparatively straight, forward from the interorbital space; adpressed, the leg reaches to the middle of the space between the orbit and the ear; the lamellæ under phalanges ii and iii of the fourth toe number about twenty-eight; the tail is more than twice as long as both head and body; and the loreal rows are commonly three, sometimes four.

On *A. principalis* the snout is but about one and two-thirds times the length of the space between the orbit and the ear; the frontal ridges are less sharp and prominent, and spread farther apart or are more crooked in the prefrontal region; the leg reaches the anterior border of the ear; there are about twenty-five lamellæ under phalanges ii and iii of the fourth toe; the tail is about one and three-fourths times as long as head and body; and the loreal rows are five, rarely six or four.

Forty specimens, from Caibarien, by N. H. Bishop, and from Matanzas, Havana, and Bahia Honda, by the writer.

ANOLIS CHLOROCYANUS *Dum. Bibr.*, 1837.

Hab. Samana, San Domingo. Collected by M. A. Frazar.

ANOLIS CÆLESTINUS *Cope*, 1862.

From Hayti by Doctor Weinland; from Tiburon, Hayti, by S. Garman.

ANOLIS PULCHELLUS *Dum. Bibr.*, 1837.

From Port au Prince, Hayti, by Professor Ackermann; from Bayamon, Porto Rico, and from St. Thomas by the writer. Thirty-three specimens.

ANOLIS SEMILINEATUS Cope, 1864.

From Samana, San Domingo, M. A. Frazar.

NOROPS OPHIOLEPIS Cope; Bocourt.

Cuba, Prof. S. H. Scudder.

POLYCHRUS MARMORATUS L.; Merr.

Trinidad. Eleven specimens, C. S. Cazabon and S. Garman.

LIOCEPHALUS VITTATUS Hallow.; Reinh. & Lütke.

Cuba, and Matanzas, Cuba, C. J. Maynard and S. Garman.

LIOCEPHALUS MELANOCHLORUS Cope, 1862.

Jeremie, Hayti, Doctor Weinland; Tiburon, Hayti, by the writer.

LIOCEPHALUS PERSONATUS Cope, 1862.

Jeremie, Hayti, Doctor Weinland; Puerto Plata, San Domingo, M. A. Frazar.

LIOCEPHALUS CARINATUS Gray, 1827.

Cuba and New Providence, Bahamas, C. J. Maynard.

LIOCEPHALUS VARIUS Garman, 1887, Pr. Am. Phil. Soc.

Grand Cayman Island, W. B. Richardson.

URANISCODON PLICA L.; Kaup.

Trinidad.

CYCLURA CARINATA Harl., 1824.

Turks Island, A. S. Bickmore.

There are combs on both third and fourth toes. Scales above the snout small and irregular; teeth serrated.

CYCLURA NUBILA Gray, 1831.

Cuba ?. Collector ?.

The plates above the snout are broad and flattened ; the combs appear on both third and fourth toes ; teeth serrated.

CYCLURA CORNUTA, *Daudin* sp.

Metopocerus cornutus Wagl.

Jeremie, Hayti, Dr. D. F. Weinland ; Navassa, Prof. S. F. Baird.

In the memoirs of the Mus. Comp. Zoöl., VIII, 1883 (Rept. and Batr. N. Amer., Introd., p. xiii) the writer called attention to the peculiar specialized corneous digging combs on the third and fourth toes of the hind foot of this lizard. Since that time this apparatus has been found by Professor Cope to mark the species of *Cyclura*, also of burrowing habits, and to afford a most important character in distinguishing them from the species of *Ctenosaura*.

IGUANA TUBERCULATA *Laur.*, 1768.

Trinidad, C. S. Cazabon ; Saba, F. Lagois ; St. Thomas, S. Garman ; Grenada, P. Gellinau.

The Grenada specimens are intermediate between *I. tuberculata* and *I. rhinolopha*. They have one prominent series of tubercles on the neck, and several scattered ones above the hinder extremity of the series. The tubercles on the snout are not so prominent as in *I. rhinolopha* from Central America, but the arrangement is the same. The tubercles on the neck are comparatively few as compared with those on Nicaraguan types.

IGUANA DELICATISSIMA *Laur.*, 1768.

Nevis and St. Barts, F. Lagois.

The eggs of these specimens are elongate, about one and seven-eighths inches by one and one-eighth.

ON WEST INDIAN REPTILES.

SCINCIDÆ.

BY SAMUEL GARMAN.

MABUIA SLOANII *Gray*, 1845.

Supranasals separated behind the rostral; parietals in contact behind the interparietal; two pairs of broad nuchals; four supraorbitals; four labials in front of the sub-orbital, sometimes five; scales smooth, in thirty rows around the body; fifty-four to fifty-five from chin to vent in the mesial row.

Jamaica.

MABUIA NITIDA, sp. n.

Supranasals in contact; parietals in contact; two pairs of nuchals; four supraorbitals, sometimes three; four supraciliaries; five labials in front of the suborbital, sometimes four; scales smooth, in thirty rows, sixty to sixty-three from chin to vent. Tail one and one-half times the length of head and body.

Olive, bronzed; a brownish band from nostril to hip is edged with an indistinct band of lighter above and below: a few, angular small spots of brown, with white lateral edges, on back and limbs.

Porto Rico; San Domingo.

MABUIA LUCIÆ, sp. n.

Supranasals in contact; parietals in contact; one to two pairs of nuchals; four supraorbitals: four labials in front

of the suborbital; scales striate, in thirty rows, sixty-six from chin to vent. Tail one and one-half times the length of body and head.

Olive, bronzed; nearly uniform brownish posteriorly; anteriorly with an irregular and broken band of brown from snout to shoulder; arm and neck to flank with dark-edged small spots of white; dark edges on the scales form obliquely transverse streaks on the back; dark lateral edges of the ventrals form longitudinal lines of brown from chin to tail.

St. Lucia.

MABUIA DOMINICANA, sp. n.

Supranasals separate; parietals in contact; nuchals one pair; four supraorbitals; four labials in front of the suborbital, sometimes five; scales rugose, in thirty to thirty-two rows, sixty-eight to seventy-two from chin to vent. Tail about one and two-thirds times as long as head and body.

Brownish-olive, bronzed; a dark band from snout to hip, edged above by a paler one and below by a white line that becomes indistinct backward; white beneath. Forward on young specimens the pale bands are white, and at the inner edge of each, on the back, there is a series of brown spots.

Dominica.

MABUIA MABOUIA, sp. *D. & B.*

Supranasals separate; parietals in contact; nuchals one pair; three supraorbitals; four labials in front of the suborbital, sometimes five; scales with faint striæ, in twenty-eight to thirty rows, sixty-three to sixty-five from chin to vent.

St. Pierre and Ft. de France, Martinique.

MABUIA AENEAE Gray, 1845.

Supranasals separate; parietals separate; nuchals one pair; four supraorbitals; five labials in front of the sub-orbital, sometimes four; scales feebly striate, in twenty-eight to thirty rows, fifty-four to fifty-eight from chin to vent.

St. Vincent; Grenada; Trinidad.

MABUIA AGILIS Radd.; Fitz.

Supranasals in contact; parietals in contact; nuchals one pair; four supraorbitals; four labials in front of sub-orbital; scales in thirty rows, striæ faint, fifty-four to fifty-six scales from chin to vent.

Rio Janeiro, Para and Villa Bella, Brazil.

MABUIA AURATA Schn.; Ptrs.

Supranasals usually separated; parietals in contact; nuchals one pair; four supraorbitals; four labials in front of the suborbital; scales smooth, in twenty-eight to thirty rows, fifty-eight to sixty-two from chin to vent.

Rio Janeiro and Goyaz, Brazil, to Turbo, Chagres River and Nicaragua on the Isthmus.

The specimens from which the foregoing notes have been taken are in the Museum of Comparative Zoology at Cambridge, Mass., U. S. A.

4.08
June 4 1888

BULLETIN

OF THE

ESSEX INSTITUTE.

VOL. 19. SALEM: APRIL, MAY, JUNE, 1887. Nos. 4-5-6.

ANNUAL MEETING, MONDAY, MAY 16, 1887.

Held this evening at 7.30 o'clock: The President in the chair. Records of preceding annual meeting read and approved.

This is the first annual meeting of the Institute, when it can be said that a portion of its library and of its collections is deposited in a building of its own and that the remainder is in process of removal. On this occasion it may be appropriate to allude to some incidents in its organization.

In the winter of 1832-3, the bookstore of Mr. John M. Ives (the same now occupied by Jacob Young, 201 Essex street) was frequented by many of the professional men, teachers, and others especially who had a penchant for literary pursuits. Among them were several recent graduates of our colleges engaged in professional studies and some in the various business pursuits.

Mr. Edwin P. Whipple, in his reminiscences of eminent men, speaking of Rufus Choate says, "At the period when he was a young man, practising in the courts of Essex County, he 'pervaded,' if I may use his own term, the Salem bookstores in his leisure hours. He was specially

attracted to the store of Mr. John M. Ives, and he never entered it without falling into conversation with some legal or illegal brother interested in letters, and he never left it without leaving in the memory of those who listened some one of the golden sentences which dropped as naturally from his mouth as pearls from the lips of the fabled fairy. There was a circulating library connected with Mr. Ives' bookstore, and I have a vivid remembrance, when as a boy I was prowling among the books on the shelves suspending my decision as to taking out a novel of Richardson, or Fielding, or Miss Porter or Scott, of listening with a certain guilty delight at the chaffing going on among my elders and betters in the front store. I remember perfectly how I was impressed and fascinated by the appearance of Mr. Choate. He was not a Thaddeus of Warsaw, nor a hero of the type which Mrs. Radcliffe had stamped in my imagination, but there was something strange, something 'oriental' in him, which suggested the Arabian Nights. In after years, I wondered, as I wondered then, that such a remarkable creature should have dropped down, as it were, into Essex County. There seemed to be no connection between the man and his environment. He flashed his meaning in pointed phrase while his interlocutors were arranging parts and preparing arguments, and darted out of the store with a ringing laugh."—E. P. Whipple's *Recollections of Eminent Men*, page 2.

Mr. Benjamin H. Ives, a younger brother of the proprietor and associated with him in his business, was a student of nature especially in botany and entomology. At his suggestion the subject of organizing a natural history society was frequently discussed and a paper received some fifteen or twenty signatures for membership. Mr. Ives had also called the attention of the public to this movement by occasional articles in the newspapers. These

crude ideas did not crystallize into any permanent form until the December following, when on Saturday the 14th of that month a meeting was held and a committee chosen to prepare by-laws and report at a future meeting. At the adjourned meeting the by-laws were accepted and the following officers were elected :—

President, Andrew Nichols ; 1st Vice President, William Oakes ; 2nd Vice President, Gardner B. Perry ; Sec'y and Treas., John M. Ives ; Librarian and Cabinet Keeper, John L. Russell ; Curators, William Oakes, John Clarke Lee, Charles Grafton Page, Thomas Spencer.

In response to a circular, a gathering of the friends from various parts of the county attended a meeting at Topsfield on the sixteenth day of April, 1834. The meeting was held at the old Stage House and the organization completed, as Mr. Samuel P. Fowler stated, over a clump of Blood Root (*Sanguinaria canadensis*) in full flower, which some one had found during the forenoon ramble and placed upon the table.

Soon after this meeting, rooms were engaged over the Essex Fire and Marine Insurance company on Essex facing Central street, the same that had been used for the books of the Salem Athenæum some ten or fifteen years previously. At the same time, Vice President William Oakes of Ipswich, an original subscriber to Audubon's "Birds of America," loaned to the society some of them to be placed on exhibition. These plates, having been distributed to the subscribers only a short time before, excited a considerable interest ; a good introduction to the society's work. At the close of these reminiscences

The Report of the Secretary was read, accepted and ordered to be placed on file.

The Report of the Treasurer, approved by the auditor, was read and accepted and ordered to be placed on file.

The Report of the Librarian was read and accepted and ordered to be placed on file.

The Report of the Auditor was read and accepted and ordered to be placed on file.

The secretary read the following letter from Mr. Ross Turner donating an oil painting executed by himself.

TO THE PRESIDENT AND MEMBERS OF THE ESSEX INSTITUTE:—

Some years ago while visiting the Navy Yard at Charlestown, Mass., I saw the hulk of the old Niagara, moored out in the stream in the last stages of dilapidation and ruin. The sight of this noble ship impressed me so much that I began a picture of that subject; although I do not wish to convey the idea that I intended to make a literal portrait of the old Niagara, but to paint an old, worn-out vessel anchored to her last moorings, lighted by the glowing light of sunset. This picture I entitled "The Last Haven," and with your permission I wish to offer it as a gift to the Art Department of the Essex Institute, as a sort of memorial of the ship that assisted in laying the first Atlantic cable.

With much respect I am yours,

ROSS TURNER.

March 31, 1887.

126 Bridge Street, Salem, Mass.

The following letter was also read :

Salem, May 16, 1887.

TO CAPT. G. M. WHIPPLE,

SEC'Y ESSEX INSTITUTE.

DEAR SIR :

I have been commissioned by a much admired artist, long time resident at New York, but a native of Salem, Miss Fidelia Bridges, to tender in her name, to the Essex Institute, the charming picture of "Pastures by the Sea" painted by her and now for the first time shown to the public; and to beg its acceptance as a token of her continued regard for her native city and as an earnest of her interest in the new career upon which the Institute is entering.

The picture measures fifteen by twenty-nine inches. It shows the correctness of manner and delicacy of touch which characterize the work of this artist. Its merits speak for themselves, and entitle it to a conspicuous place among the works of art which will adorn the future home of the Institute.

I am, respectfully yours,

ROBERT S. RANTOUL.

The meeting voted unanimously to accept the two pictures and on motion of vice-president Hagar, the President was requested to appoint a committee of three persons to prepare appropriate letters of thanks to Mr. Turner and Miss Bridges. The President named Messrs. Hagar, Rantoul and Upham.

The committee on nomination of officers for the ensuing year presented the following list which on a ballot being taken was duly elected :

OFFICERS OF THE ESSEX INSTITUTE

MAY 1887 TO MAY 1888.

PRESIDENT:

HENRY WHEATLAND.

VICE-PRESIDENTS:

ABNER C. GOODELL, JR.

DANIEL B. HAGAR.

FREDERICK W. PUTNAM.

ROBERT S. RANTOUL.

SECRETARY:

GEORGE M. WHIPPLE.

TREASURER:

GEORGE D. PHIPPEN.

AUDITOR:

RICHARD C. MANNING.

LIBRARIAN:

WILLIAM P. UPHAM.

CURATORS:

History—HENRY F. WATERS.

Botany—GEORGE D. PHIPPEN.

Manuscripts—WILLIAM P. UPHAM.

Zoölogy—EDWARD S. MORSE.

Archæology—FREDERICK W. PUTNAM.

Horticulture—

Numismatics—MATTHEW A. STICKNEY.

Painting & Sculpture—T. F. HUNT.

Geology—

Technology—EDWIN C. BOLLES.

Music—JOSHUA PHIPPEN, JR.

COMMITTEES:

Finance:

The PRESIDENT, *Chairman ex off.*

WILLIAM MACK.

GEO. R. EMMERTON.

DAVID FINGREE.

HENRY W. PEABODY.

The TREASURER, *ex off.*

Library:

E. B. WILLSON.

HENRY F. KING.

WILLIAM D. NORTHEED.

THEODORE M. OSBORNE.

The LIBRARIAN, *ex off.*

Publication:

E. S. ATWOOD.

J. S. KINGSLEY.

JAMES A. EMMERTON.

EDWIN C. BOLLES.

T. F. HUNT.

Lecture:

ROBERT S. RANTOUL.

FIELDER ISRAEL.

FREDERICK W. PUTNAM.

A. L. GOODRICH.

WM. NEILSON.

*Field Meeting:*The SECRETARY, *Chairman ex off.*

GEORGE COGSWELL, Bradford.

GEORGE A. PERKINS, Salem.

E. N. WALTON, Salem.

CLARENCE MURPHY, Salem.

GEO. A. BATES, Salem.

FRANCIS H. APPLETON, Peabody.

N. A. HORTON, Salem.

FRANK R. KIMBALL, Salem.

W. S. NEVINS, Salem.

JOHN H. SEARS, Salem.

Mr. Rantoul, in behalf of a committee of the directors, submitted the following changes in the by-laws for adoption at this meeting, the same having been read and approved at a regular meeting held on Monday, May 2 :

FIRST. It is recommended that article one of the present by-laws be stricken out and that the following words be substituted :

ARTICLE I. MEMBERSHIP.

Section 1. Any person may be elected a member, at a regular meeting, by a majority vote of the members present and voting, the name of such person having been proposed in writing by two members at a previous meeting.

Section 2. Any person not residing in the county of Essex, who may be interested in the objects of the Institute, or desirous of promoting its work, may be elected a corresponding member at a regular meeting, by a majority vote of the members present and voting, upon the nomination of the board of directors ; but corresponding members shall not be eligible to office nor entitled to vote nor liable to assessment.

Section 3. Persons who have attained an eminent dis-

tion in science, literature or the arts, may be elected honorary members at the annual meeting by a majority vote of the members present and voting, upon nomination by the Board of Directors.

SECOND. It is recommended that Section 40 in Article VII be amended by striking out in the sixth line thereof the word "thirty" and substituting therefor the word "fifty" and further by striking out the words following the word "Institute" in the seventh, eighth and ninth lines thereof.

THIRD. In view of the generous contributions of funds with which the Treasury of the Institute has been favored ; in view of the new and enlarged facilities we are about to enjoy in a building of our own every way adapted for library purposes ; in view of the very considerable accession of valuable books which the year has brought us ; in view of the fact that an increased membership, with an additional income from assessments, would enable the Institute to open its rooms during more hours in the week and in every way render its growing advantages more available to the public ; it is recommended that a committee be chosen at this meeting which shall thoroughly examine and revise the by-laws and consider the new conditions of life upon which the Institute is entering, and report at a future meeting what changes in the organization and administration of the Institute, if any, can be made, which may be expected to result in an increase of membership and a larger return from the new facilities for which we are indebted to the liberality of the public.

Voted, That the alterations of the by-laws, recommended by the committee, be adopted, and that Messrs. Rantoul, Hunt, Willson, Upham and Wheatland be made a committee to further revise the by-laws and propose any changes which may to them seem desirable and to report the same at a future meeting.

At a meeting, Jan. 21, 1887, a committee had been appointed consisting of the President and Messrs. R. S. Rantoul and T. F. Hunt to confer with a like committee of the Trustees of the Salem Athenæum, and to consider an arrangement by which the Institute might occupy a portion of Plummer Hall, after the then existing agreement should terminate, and to report at a future meeting. The report of the above committee was presented, adopted, and placed on file.

THE RETROSPECT OF THE YEAR

compiled from the several reports read at the meeting, and the remarks of several members in relation thereto, presents the work of the Institute in its various departments since the last annual meeting.

Changes occur in the list of our associates, in the addition of new names and the withdrawal of some by resignation, removal from the county or vicinity, or by death. We have received information of the death of the following members.

EMERY KING BENSON of the firm of Benson Brothers of Boston, died very suddenly of heart disease, at his summer residence in Beverly, on Sunday, August 8, 1886. He was born in Salem, July 13, 1839, son of Capt. Samuel and Sarah M. (Prentice) Benson. He leaves a widow and children. He was a gentleman of fine culture, marked business ability and high social standing, an alderman of Salem in 1882, a member of the Water Board 1883-4. Admitted to membership Dec. 20, 1875.

NICHOLAS ARTHUR CLARKE died at his residence, on Linden Street, Salem, Friday, Dec. 10, 1886; son of George and Martha (Thompson) Clarke; born at Sanbornton

Bridge, now Tilton, N. H., Sept. 11, 1813, educated at Phillips Academy, Exeter, and Harvard College, graduating from the latter in 1838. His father removed afterwards to Stratham where he lived some years, by occupation a farmer. After being, for a number of years, a tutor in various institutions of learning both public and private, in this section and the south, he was obliged by ill health to seek a less confining profession. He was at different times connected with the Bowditch, Hamilton and Holyoke Insurance companies of Salem, and was afterwards actively engaged as an insurance adjuster throughout New England, ranking as senior in age and experience in the field. Admitted to membership Feb. 13, 1867.

GEORGE DODGE GLOVER, a member of the board of aldermen, died at Salem, on Monday, June 7, 1886. He was a son of Cook O. and Deborah M. (Foss) Glover and was born in Salem, April 30, 1823, and was educated in our public schools. He was early apprenticed to the shoe business, and many years ago, in connection with the late Abraham F. Bosson, who died Feb. 21, 1873, established the well known firm of Bosson and Glover, which has continued to this day, Harvey Bosson succeeding the father in the business. Both of the original partners were adepts in floriculture, and for years took a prominent part in the horticultural exhibitions of the Essex Institute of which they were both members, contributing fine specimens of dahlias and other choice varieties of flowers. Mr. Glover has taken great interest in the city affairs, having been for eight consecutive years a member of the Council; also on the Board of Aldermen and a member of the Board of Overseers of the Poor and a Representative in the State legislature. Admitted to membership, Feb. 25, 1858.

DR. PRESTON MARSHALL CHASE died at his residence

in Danvers, January 4, 1887. He was born in Bradford, Mass., May 12, 1827, attended the public schools of Bradford and Andover, and taught school for some time in his early manhood in several towns of New Hampshire. Subsequently he studied medicine with Dr. Fowler of Bristol, N. H., and supplemented his study by a course at the Harvard Medical School from which he graduated in 1857. He came at once to Danvers to begin practice, and for nearly thirty years he discharged all the duties of his profession and was active in the public affairs of the town of his adoption. He was a typical country physician, of fine face and figure, cheerful, jovial, known to and knowing everybody, and mixing as much inspiring courage as medicine in his sick-room prescriptions. He served a number of years on the school committee. He was appointed by Gov. Andrew to be examining surgeon for recruits in 1861. In 1870 he was appointed assistant surgeon of eighth Reg. M. V. M., and was promoted surgeon in 1875, which position he held for many years. He was a member of Jordan Lodge of Masons in South Danvers (Peabody) and was one of the charter members of Unity Lodge of Danvers and also of the Holten Royal Arch Chapter of Danvers. He married, Sept. 12, 1858, Laurinda Bailey of West Newbury; she and three sons survive him. Admitted to membership, Aug. 2, 1867.

Prof. GEORGE BAKER JEWETT died at his residence in Barton Square, Salem, June 9, 1886. He was a son of Rev. Paul Jewett (a native of Rowley) and Eleanor M., daughter of John Punchard of Salem; was born in Lebanon, Me., during his father's pastorate there, Sept. 11, 1818, and passed much of his boyhood under the supervision of his grandfather Punchard in Salem; graduated at Amherst College in 1840, and at the Andover Theo-

logical Seminary in 1843; a tutor in Amherst 1843-4; a teacher 1845-9; Professor in Amherst, 1850-5; and pastor of the First Church in Nashua, N. H., 1855-6. Since then he has generally resided in Salem, indulging his scholarly tastes, and preaching and supplying pulpits when and where his services were required. For the last two or three years of his life, he devoted his time to verifying with extremest care the classical and biblical references in a forthcoming New Testament Lexicon. Among his other literary labors were a pamphlet controversy on the revised New Testament issued by the American Bible Union and the editing of the 4th and 5th volumes of Punchard's History of Congregationalism (posthumous).

He married Mary J. daughter of Henry and Harriet (King) Whipple. She died at Salem, Aug. 30, 1887, aged 67. Admitted to membership July 6, 1864.

EMERY SAUNDERS JOHNSON born in Salem, 17 May, 1817, son of Emery and Sarah (Saunders) Johnson; died at his residence on Essex street, Salem, Dec. 13, 1886. He was brought up in David Pingree's counting room, and from there he went to sea becoming master while yet very young. In later life he was an extensive traveller visiting the other continents. He leaves a widow and one son Walter E. Johnson, a lawyer in Denver, Col. He married Ann E. daughter of Benjamin and Ann M. (Brace) Creamer. Admitted to membership March 8, 1854.

RICHARD LINDSEY died at his residence on Everett street, Salem, Nov. 22, 1886; son of Richard and Lois (Devereaux) Lindsey of Marblehead; he was born in that town, Feb. 22, 1809; married, in 1837, Sophronia, daughter of Ezra and Polly (Lakeman) Fiske, born in Salem, May 24, 1808. For many years he kept a trading store of West India goods and groceries on Lafayette street, Salem. Admitted to membership July 22, 1857.

HENRY OSBORNE died at the Salem Hospital, August 14, 1886. He was son of Henry and Mary (Ward) Osborne, born in Salem on the second of January, 1809.

In early life he was a hatter and for many years was associated with his brother, the late Stephen Osborne, and continued the business for several years after his brother's death. Their store on the corner of Essex and Central streets was one of the oldest in the city. He was a man of quiet habits and of sterling integrity. His wife was Louisa Shreve born Jan'y 14, 1817, daughter of Isaac and Hannah (Very) Shreve; one son Rev. Louis S. Osborne, graduate Harvard, 1873, Rector of Trinity Church, Chicago, Ill., survives. Admitted to membership March 29, 1854.

AUGUSTINE STANIFORD PERKINS died at Salem, on Monday morning, Dec. 13, 1886, son of Aaron and Sarah (Staniford) Perkins, born at Ipswich May 13, 1813. He was for many years an energetic and active shipmaster in the Zanzibar trade, and was one of the original "fortyniners" in command of the barque Eliza which sailed from Salem in December, 1848, and was one of the first vessels that went to California at the time of the gold discovery. Admitted to membership Feb. 22, 1854.

GEORGE C. PEIRCE, of Peabody, died after a long illness, on Thursday, Nov. 11, 1886. He was born in Medford, May 2, 1814, son of Jonathan and Lydia (Osborne) Peirce. In early life he entered the employ of the late Caleb Peirce as a dyer, afterwards a manufacturer, and about 1850 introduced a new industry, the making of Russia caps and lambs' wool cork soles. He was public spirited and interested in the affairs of the town; chief engineer of the fire department in 1868 and was one of the committee on the introduction of water; for several years captain of the Danvers Light Infantry. He leaves

a widow, a son, George O. Peirce, and a daughter. Admitted to membership, Aug. 20, 1877.

ELIZABETH APPLETON PUTNAM died at her residence in Salem, April 27, 1887, daughter of Nathaniel and Elizabeth (Ward) Appleton; born at Salem, July 10, 1804; married Eben Putnam, a graduate of Harvard in the class of 1815; postmaster of Salem 1829-40; died April 3, 1876 (see Bulletin Essex Inst., Vol. VIII, p. 45). Her facility for graceful versification was remarkable. Admitted to membership August 9, 1865.

XENOPHON H. SHAW, the oldest of Salem's business men, died suddenly at his home on Tuesday, Dec. 7, 1886. He was son of Darius and Johannah (Winship) Shaw, and was born in Lexington, Jan. 10, 1799. He married Eliza C., daughter of Elijah and Lucy (Collins) Haskell. He had for sixty-six years carried on the gilding and picture frame business at 283 Essex street both before and since the building of Mechanic Hall. His character was one of the sturdiest and most manly, upright and honest, and his sterling and kindly qualities endeared him to every one with whom he came in contact. Admitted to membership July 6, 1864.

HENRY FRANCIS SKERRY died at his home on Hazel street, Salem, Nov. 1, 1886, son of Francis and Phebe W. (Bancroft) Skerry, and was born July 25, 1821; a member of the English High School, after leaving which he engaged in the business of his father, on Essex street. In 1842 he united himself with the Central Baptist Church. In the following autumn removed to Bangor, Me., where he remained eleven years; coming again to his native city, he identified himself with the same Church and was secretary or superintendent of the Sunday School, or a deacon serving until the Calvary Church was formed,

when he became one of its constituent members and served it in the capacity of Deacon until he died. Admitted to membership Oct. 7, 1857.

CHARLES FRANCIS ADAMS died on Sunday morning, Nov. 22, 1886, at his home on Mt. Vernon street, Boston. He was the son of John Quincy and Louisa Catherine (Johnson) Adams and was born in Boston, August 18, 1807. Graduated at Harvard College, 1825. The next two years were passed in Washington as the confidential secretary of his father. After preliminary studies with Daniel Webster, he was admitted to the Suffolk Bar in 1828; in 1829, 3d Sept., married Abigail Brown, youngest daughter of Hon. Peter C. Brooks. During the period before the war he wrote several articles for the *North American Review*; was member of both Houses of Massachusetts legislature, and a member of the 36th Congress. One of the first appointments of President Lincoln was that of Mr. Adams as minister to England. Early in 1868 Mr. Adams, after seven years of absence, asked to be released from longer service. On his return home he became again a resident of Boston and Quincy devoting himself to those literary pursuits in which he always found great pleasure. The record of his election to corresponding membership, bears date, Wednesday, Aug. 11, 1852.

NATHANIEL ELLIS ATWOOD, son of John Atwood of Provincetown, Mass., was born in that town, Sept. 13, 1807. In 1816, the family removed to Long Point, the very tip of Cape Cod, to enable them the better to pursue their calling, and here their son Nathaniel, at the age of nine, began his service in the open fishing boat. In early manhood he had risen to the command of a vessel engaged in the fisheries on the banks of Newfoundland. Fishing

was his favorite employment and he continued in it until near his sixtieth year. He then engaged in the manufacture of cod liver oil, which he successfully pursued during the remainder of his life. In early life he began to observe the habits and characteristics of fishes, and to read such books on natural history as he could obtain. Keen observation and a powerful memory enabled him to accumulate a great quantity of novel information, all of which was placed at the service of Dr. D. H. Storer during the preparation of his report on the fishes of Massachusetts published in 1843. His special knowledge on these and kindred subjects naturally attracted the attention of Prof. Louis Agassiz, who, in 1852, visited him at his home on Long Point; this was the beginning of a lifelong friendship.

His growing acquaintance with scientific men, who appreciated his peculiar attainments, was an inducement to redouble his efforts in his favorite studies and pursuits.

Under a resolve of the Legislature approved May 16, 1856, the Governor was authorized with the advice of the Council to appoint three commissioners, whose duty it should be to ascertain and report to the next General Court such facts respecting the artificial propagation of fish as might show the practicability and expediency of establishing the artificial propagation of fish and the restocking of the interior waters of the State.

Capt. Atwood was appointed one of these commissioners, and to him was intrusted the duty of making the observations and conducting the preliminary experiments. Temporary arrangements for this purpose were made at Sandwich, and here he made the first experiments of the kind in this State, and proved that the artificial fecundation of the eggs of trout could be accomplished, although he did not in these first attempts succeed in keeping the

embryos alive until they had reached their full development, owing to the attacks of a fungus, but he showed the methods to be followed which would lead to success.

The report of the commission was the first document of the kind published in this country, and the opinion is there expressed that the artificial propagation of fish is not only practicable but may be made very profitable, and that our fresh waters may thus be made to produce a vast amount of excellent food; that a small outlay of capital and a moderate degree of skill will enable the proprietors of our smaller streams and ponds to stock them with valuable fish; that in respect to the larger rivers and ponds a combination of individuals may be necessary, with special legislation adapted to each particular case. From this report made by Capt. Atwood and his two associates has resulted the Board of Commissioners on Inland Fisheries, whose labors for the past twenty-three years have proved the conclusions arrived at by this preliminary work, and ponds, streams and rivers have been stocked with fishes of several kinds, both native and foreign, by means of artificial propagation.

Capt. Atwood served in both branches of the Massachusetts Legislature: in the House, 1857, 1858, and in the Senate, 1869, 1870, 1871, where his knowledge of the sea-fisheries and an interest in the restocking of our rivers with fish were of great importance to the Commonwealth. During these several sessions he delivered important speeches on the sea-fisheries. He lectured on these subjects in many of the lecture courses in eastern Massachusetts, and in 1868 he gave a course of twelve lectures on fishes before the Lowell Institute, which were so well received that an invitation was extended to him for a second course on the same subject during the following season.

Indeed, he lived to see the subject of ocean and inland

fisheries, about which little was known in his youth, submitted to scientific investigation by national and state commissions, to which he was a valuable contributor.

Capt. Atwood was a member of the Boston Society of Natural History, of the Society of Arts of the Massachusetts Institute of Technology and of the American Academy of Arts and Sciences. He was elected a corresponding member of the Essex Institute, Aug. 27, 1856.

He died at his home in Provincetown on Sunday, November 7, 1886, after a lingering illness.

ISAAC LEA, LL.D., the distinguished naturalist, who earned a world-wide fame by his extensive researches in science, died on Wednesday, Dec. 8, 1886, at his residence in Philadelphia, in the ninety-fifth year of his age. His principal works are devoted to conchology and some departments of palæontology.

His investigations of the American Unios began in 1825 on receiving some specimens from the Ohio river; and when they terminated in 1874, he had published thirteen volumes.

He was born in Wilmington, Delaware, March 4, 1792. He became a member of the American Philosophical Society in 1828; was president of the Academy of Natural Sciences of Philadelphia from 1853-1858, and at the time of his death he was an honorary member of many of the scientific, philosophical and historical societies of the world. He received the degree of LL.D., from Harvard in 1852. In 1860 he presided at the meeting of the American Association for the Advancement of Science, held at Newport, R. I. A complete detailed list of his publications with a biographical sketch is contained in number twenty-three of the Bulletin of the United States National

Museum. Elected a corresponding member, March 5, 1866.

REV. CHARLES CHAUNCY SEWALL was born at Marblehead, May 10, 1802; the youngest son of chief justice Samuel and Abigail (Devereux) Sewall. In early life he lived in New York city with an elder brother and entered his store as a clerk. He then went to Phillips Academy, Exeter, where he was fitted for Bowdoin College, which he entered in 1822. On leaving college, he turned his thoughts to the pulpit; and, in the family of Rev. John White of West Dedham, he found a quiet but congenial home for his studies which he pursued with marked diligence and attention. He was installed April 11, 1827, the first pastor of the Unitarian church of Peabody, and resigned in the summer of 1841. He removed to Medfield where he was occupied in farming and in successively supplying the pulpits of East Lexington, Lincoln, Wayland and Sharon. He was a faithful attendant at the local conferences and the gatherings of ministers. His name has also been associated with the affairs of the town, in many important trusts; as selectman, town clerk, town treasurer, member of the school board, representative to the Massachusetts legislature, etc. He was an early abolitionist, in sympathy with Whittier and Garrison. In his pastoral relations he responded readily to all calls for his services. He was a voluminous correspondent, and wrote poems, articles for the newspapers, essays, reports, sermons, etc. He died at his residence in Medfield, Nov. 22, 1886. He married Amy, daughter of William Peters, Esq., of Medfield, Oct. 1, 1823. She died Aug. 15, 1872. He was an original member of the Essex Institute, having been, at its inception in 1848, an honorary member of the Essex Historical Society.

MEETINGS. Regular meetings were held on the first and third Monday evenings of each month. The following communications and lectures may be specified :

Rev. S. L. Gracey, "The New England Thanksgiving."

J. W. Fewkes, of Cambridge, "A Naturalist's Visit to Grand Menan."

F. W. Putnam, of Cambridge, "General burial places of the Mound builders, particularly the makers of those known as the Turner Group of the Little Miami Valley, Ohio."

William D. Northend, "The Settlement of the Massachusetts Bay Colony."

John T. Moulton, of Lynn, "Inscriptions from the old Burying-ground, Lynn."¹

Andrew McFarland Davis, of Cambridge, "Indian Games;" "A few additional notes concerning Indian games."²

George M. Whipple, "A Sketch of the Musical Societies of Salem."³

William P. Upham, "Account of the Rebecca Nurse Monument."⁴

Richard H. Derby, of New York, "Roger Derby."⁵

Robert S. Rantoul, "A Contribution to the History of the Ancient Family of Woodbury."⁶

Wellington Pool, of Wenham, "Inscriptions from the old Burying-ground, Wenham."⁷

J. H. Sears, "Dermatochelys Coriacea, Trunk Back or Leathery Turtle;" "List of native and introduced plants observed in flower in the vicinity of Salem, during the spring of 1886, on or before May 1."⁸

¹ See Hist. Coll., vols. XXII, XXIII.

² See Bull., vol. XVII, p. 89 and vol. XVIII, p. 168.

³ See Hist. Coll., vol. XXIII, p. 72.

⁴ See Hist. Coll., vol. XXIII, p. 151.

⁵ See Hist. Coll., vol. XXIII, p. 229.

⁶ See Hist. Coll., vol. XXIV, p. 1.

⁷ See Hist. Coll., vol. XXIV, p. 72.

⁸ See Bulletin, vol. XVIII, pp. 87, 95.

J. S. Kingsley, "The Development of *Crangon Vulgaris*,"—second paper.⁹

F. W. Putnam, "Conventionalism in ancient American Art."¹⁰

Samuel Garman, "On the West Indian *Teiidae* in the Museum of Comparative Zoölogy;" "West Indian *Batrachia* in the Museum of Comparative Zoölogy;" "On West Indian *Geckonidae* and *Anguidae*;" "On West Indian Reptiles—*Iguanidae*, *Scincidae*."¹¹

Geo. B. Blodgett, "Early Settlers of Rowley, Mass." (concluded).¹²

James A. Emmerton, "Salem Baptisms" (concluded).¹³

FIELD MEETINGS. — Two have been held during the season: *First*, on Thursday, July 1, 1886. A very pleasant excursion to the North part of the county, among the towns in the valley of the Merrimac. A party left Salem by rail for Newburyport, thence by carriage to the place of rendezvous, West Newbury, one of the most attractive of our farming towns, passing on the way Moulton's Hill and Curson's Mills, and the well-known Laurel Grounds owned by Mr. E. S. Moseley of Newburyport, from whom a kind invitation to visit the same was extended. Arriving at the place of meeting about noon, we there met many friends who had joined the party on the way, or had come in various modes of conveyance from the adjoining towns, and the members of the West Newbury Natural History Club, our hosts on this occasion; a couple of hours were spent in partaking of a most excellent lunch and in social conversation. The afternoon session

⁹ See Bulletin, vol. XVIII, p. 99.

¹⁰ See Bulletin, vol. XVIII, p. 155.

¹¹ See Bulletin, vol. XIX, pp. 1, 13, 17, 25, 51. ¹² See Hist. Coll., vol. XXIII, pp. 231,

¹³ See Hist. Coll., vol. XXIII, pp. 81, 161, 211. 304; vol. XXIV, p. 43.

was called to order in the Town Hall at 2 P. M. by the President who made a few introductory remarks and then called upon Mr. Haydn Brown of West Newbury, who gave a familiar talk on "Our Song Birds," a subject to which he had devoted much observation and study. He said that there were three hundred and thirty-two varieties of birds recorded in Massachusetts. About eighty of these varieties are our summer residents, raising their young in this neighborhood. The handsomest birds in plumage are not the best songsters. The Bartram Sandpiper or Field Plover was fully described as to its habits, singing, etc. Robins, he said, are fast increasing and they build near dwellings. Their best singing is in the morning just before daybreak.

The warblers, field sparrows, orioles, swallows and other varieties were alluded to, and their peculiar characteristics were noted. A collection of well prepared specimens of birds was shown as the different varieties were described. Mr. M. Walsh Bartlett apologized for the absence of Mr. T. C. Thurlow, president of the club, who was kept at home by illness. Mr. Bartlett welcomed the Institute to West Newbury, and mentioned that the geology of the place is interesting, and hoped that at some future time the Institute would make a thorough geological examination of this vicinity. Mr. John H. Sears described the flora of the place, showing the specimens that he had collected, and giving some simple and practical hints to students in botany.

It was *voted* that the very cordial thanks of the Institute be extended to the members of the West Newbury Natural History Club, for the refreshing and bountiful lunch so handsomely served, and to the ladies who had kindly assisted in making this gathering so successful; also to

the town authorities for the use of the hall for the purposes of the meeting. At the close of the meeting the party were conveyed in horse cars to Haverhill, thence by steam cars to Salem, by way of Sutton's Mills, Middleton and Danvers, arriving about 7 P. M.

Second, at Plum Island on Wednesday, Aug. 11, 1886. A goodly company left the Boston and Maine station, Salem, about eight in the morning. On arriving at Ipswich, they repaired to the wharf, where the little steamer *Carlotta* was in readiness to convey them to the Island.

The sail down Ipswich River is very pleasant: the river is very crooked, its sharp windings giving diversity to the trip and adding much to its attractiveness. There are several landings along the river and on the Island, where there are clusters of houses which are let for summer camping purposes. One steamboat runs regularly to Ipswich, and another to Rowley, while excursion boats from Newburyport are frequent visitors.

The afternoon meeting was held in a barn, which was extemporized for a lecture room.

The President, in opening the proceedings, referred to the different kinds of meetings the society has held. During the sail down the river he was reminded of the great interest that was felt, several years ago, in the shellheaps at Eagle Island, and other places contiguous, when the locality was visited by distinguished scientists. He also alluded to the foundation of the Museum of American Archaeology and Ethnology at Cambridge by the liberality of George Peabody, and to the instrumentality of Prof. Jeffries Wyman (who was appointed the first curator of the Museum) in giving an impetus to archaeological research, which has made rapid progress since his time. Since Prof. Wyman's death, the museum has been under

the direction of Prof. F. W. Putnam, his immediate successor in office, and it has become one of the best known and most useful institutions of its character in the country.

Mr. J. S. Kingsley (who is now conducting microscopic examinations and zoölogical investigations at Salem Neck) gave a familiar talk upon the eye. He first described the human eye and explained, with the aid of blackboard drawings, how the eye receives the object on the retina, and how the optic nerve connects the retina with the brain. The different parts of the picture are produced on different sections of the retina, each section taking its own, and the brain somehow putting these parts together to form the perfect picture. In the classes of animals other than the vertebrates, eyes are not always placed in the head, nor are they always two in number. He explained this in the case of starfishes, worms, and in certain mollusks, which have a large number of eyes.

Mr. John H. Sears of Salem was called upon to speak of the seashore plants, many of which he exhibited and described. He also said that many of the plants found here were not peculiar to the seashore, for they could be found about us on the mainland. Among the woods which he considered indigenous to Plum Island were the pitch pine, white and red oaks, maple, juniper, and some others; and also certain shrubs, many of which are to be found on the mainland. He also spoke of two forms of grape vine to be found here, and exhibited the plum bush, with some of the fruit upon it, this being the fruit from which the Island takes its name.

Prof. A. C. Perkins of Brooklyn, N. Y., and formerly principal of Phillips Academy, Exeter; Messrs. Alfred Osgood of Newburyport, N. A. Horton of Salem, C. A. Sayward of Ipswich, and others offered remarks.

Voted. That the thanks of the Institute are hereby tendered to Mr. Wm. C. Cullen, the landlord of the hotel, and to Mr. N. F. Hopkins of Salem, for kind attentions and civilities. Adjourned.

LIBRARY.—The additions to the Library for the year (May, 1886 to May, 1887) have been as follows :

By Donation.

Folios,	298
Quartos,	485
Octavos,	2,760
Duodecimos,	1,618
XVI mos,	650
XXIV tos,	183
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Total of bound volumes,	5,994
Pamphlets and serials,	11,610
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Total of donations,	17,604

By Exchange.

Quartos,	13
Octavos,	173
Duodecimos,	26
XVI mos,	1
XXIV tos,	1
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Total of bound volumes,	214
Pamphlets and serials,	2,897
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Total of exchanges,	3,111

By Purchase.

Octavos,	8
Duodecimos,	10
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Total of bound volumes,	18
Pamphlets and serials,	6
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Total of purchases,	24
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Total of donations,	17,604
Total of exchanges,	3,111
Total of purchases,	24
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Total of additions,	20,739

Of the total number of pamphlets and serials, 2,731 were pamphlets, and 11,782 were serials.

The donations to the Library for the year have been received from one hundred and fifty-nine individuals and seventy-two societies and governmental departments. The exchanges from eight individuals and from one hundred and sixty-six societies and incorporate institutions of which ninety-two are foreign; also from editors and publishers.

It must be very gratifying to all the friends of the Essex Institute to reflect that while every year since its organization has witnessed a constant increase in its prosperity and usefulness, the past year has added to its material resources more abundantly than ever. The purchase of the Daland estate gives us a most commodious and convenient building for the reception of that part of our library which is most used for reference and circulation, as well as fire-proof rooms for the most valuable portion of our collections. In connection with the facilities afforded us by the lower rooms of Plummer Hall, it is hoped that sufficient room will be found for the present to arrange properly the whole library, now consisting of 50,000 bound volumes, besides our great collection of pamphlets and newspapers. In 1855 the number of bound volumes was stated to be 10,000.¹ From that time to 1872 the total of bound volumes added to the library was 16,118 or an average of 895 per year. From 1873 to 1886 the total was 17,656, averaging 1,261 each year. Adding to these the donations of the past year gives the present total of bound volumes just 50,000.

With such rapid growth the time will soon come when still larger accommodations will be required.

Among the donations to the library (which much exceed

¹ See second "Act of Incorporation" Dec., 1855.

those of any previous year) the following may be mentioned as especially important.

The library of the late Augustus Story bequeathed by his sister, Miss Eliza Ann Story, was received in October, 1885, but was not recorded till the present year. It consists of 1,318 bound volumes and 3,028 pamphlets and serials, and is especially rich in literary and standard works, including many rare and finely illustrated volumes. This collection will be kept by itself in accordance with the request of Miss Story.

The library of the late Francis Peabody, presented by his widow Mrs. Martha Peabody, contains 3,055 bound volumes and 1,103 pamphlets and serials. This most generous donation is especially valuable for the great number of works relating to science and the mechanical arts, agriculture, horticulture, photography, etc.

Mr. T. F. Hunt, our curator of painting and sculpture, has presented to the library his unique collection of works relating to China, over 600 volumes. Probably no more extensive or valuable collection of books on this subject can be found in this country. We are also indebted to Mr. Hunt for a large increase of the Art Library founded and maintained by him.

Donations or exchanges have been received from the following :—

	Vols.	Pam.
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Regensburg, Naturwissenschaftlicher Verein,		1
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Winchell, N. H., Minneapolis, Minn.,	2	
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Worcester, Samuel,	1	3
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Wright, W. H. K., Plymouth, Eng.,		11
Würzburg, Physikalisch-Medicinische Gesellschaft,	2	
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The following have been received from editors or publishers :

American Exchange and Mart.	Naturalists' Leisure Hour and Monthly Bulletin.
American Journal of Science and Art.	Nature.
Bay State Monthly.	New England Magazine.
Cape Ann Advertiser.	Our Dumb Animals.
Chicago Journal of Commerce.	Peabody Press.
Danvers Mirror.	Peabody Reporter.
Fireside Favorite.	Sailors' Magazine and Seamen's Friend.
Gardener's Monthly and Horticulturist.	Salem Daily Times.
Ipswich Chronicle.	Salem Evening News.
La Bibliophilie.	Salem Gazette.
Lawrence American.	Salem Observer.
Le Naturaliste Canadien.	Salem Register.
Lynn Bee.	Salem Telegram.
Manifesto, The.	Traveller's Record.
Marblehead Messenger.	Turner's Public Spirit.
Musical Herald.	Voice, The.
Musical Record.	Wade's Fibre and Fabric.
Nation, The.	Zoologischer Anzeiger.

PUBLICATIONS. As heretofore, the Historical Collections and the Bulletin have been issued ; both the historical and the scientific departments receive valuable accessions in exchange for these from kindred societies in other countries as well as in our own land.

A ROSE SNOW was held on June 23. Some forty different varieties were shown and among them were some very beautiful specimens. A peculiar flowering shrub,¹ bearing a handsome flower and a profusion of blossoms, was contributed by Mr. Robert Manning, who received honorable mention. Mr. John Robinson exhibited a Japanese rose and several beautiful specimens of the hardy rose, for which he received honorable mention; as did Mr. Geo. R. Emmerton, Mrs. S. G. Wheatland, Mrs. C. H. Miller, Mrs. D. A. Varney, Mrs. H. A. Cook, Mr. Geo. D. Putnam, Mr. James F. Almy and Mrs. William M. Whitney of Beverly, for their exhibits. There were twenty-three exhibitors; premiums of moderate amounts were awarded to Charles E. Marsh of Lynn, William J. Foster of Salem, and J. M. Ward of Peabody.

MUSEUM. The specimens in natural history including those in archæology, which have been received during the year, have been placed on deposit with the trustees of the Peabody Academy of Science, in accordance with previous arrangements. Those of an historical character, or which possess an artistic interest, have been placed in the rooms. There have been one hundred and ninety-eight contributions; prominent among these is a large and rare collection of War Envelopes, which was made with much care and at considerable cost by the late Mr. George Perkins of this city, who while living was an active and useful member of the Institute. A valuable historical painting, "The Last Haven," by Ross Turner, and "Pastures by the Sea," by Miss Fidelia Bridges, of New York, have been presented by the artists and will adorn the walls of the new building.

The donors to the museum are the following:—

¹ *Actinidia polygama*.

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THE NINTH ART EXHIBITION opened on June 3 ; the preceding evening a reception was given to the contributors and their immediate friends ; a lunch was served and the visitors were entertained with orchestral music under the direction of F. Clayton Record ; the exhibition closed on June 19. It was confined to paintings in oil, water colors, charcoal, etc., by the artists and amateurs of Salem and its immediate vicinity. A large majority of the artists were residents of this city, and Salem may take just pride in the genuine artistic merit here displayed. The collection embraced two hundred and forty-six exhibits, and was especially strong in figure pieces and portraits ; including a very striking portrait of the daughter of Ralph Waldo Emerson, by J. J. Redmond ; that of Salem's well-known and oldest clergyman, Rev. E. B. Willson, by F. W. Benson ; one of Clark Oliver, most life-like, by C. C. Redmond, and the ideal portraiture of "Kilmeny" by Miss H. F. Osborne. A portion of the pictures were arranged for a summer exhibition and remained in the hall through July and August. The collection was larger and more varied than usual. Among the more celebrated artists who contributed this year may be mentioned Ross Turner, George H. Clement, Philip Little, H. A. Hallett, F. W. Benson, George W. Harvey. The exhibition was considered by competent judges to be of more than usual merit.

The following is a list of the artists and contributors :—

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Mrs. E. Hobbs.	Miss A. S. Tukey.
Miss Minnie L. Hobbs.	Ross Turner.
Miss A. B. Holden.	Miss Ida F. Upton.
Miss Lucy B. Hood.	Miss J. S. Warden.
Miss S. S. Kimball.	Miss M. L. Webb.
Miss L. Lander.	Miss I. Whidden.
Mrs. E. A. Leavitt.	Miss L. B. Whipple.
Phillip Little.	Miss E. O. Williams.
Miss M. Lyman.	Mrs. E. B. Willson.
Mrs W. S. Nevins.	Mrs. Frank Winn.
George Newcomb.	

FINANCIAL.—The Treasurer's report of the receipts and expenditures of the past year (condensed for printing) :

RECEIPTS.

Balance of last year's account,	\$112 33
Assessments of members,	854
Income of invested funds,	2,185 16
Sale of publications,	947 45
Income from rents,	133 87
Salem Athenæum, portion of bills paid,	172 37
	<hr/> 4,405 18

EXPENDITURES.

Salaries of secretary, ass't librarian, and janitor, . . .	1,920	
Publications and printing,	1,330	47
Books, binding and miscellaneous printing,	623	20
Fuel, gas, stationery, express and incidentals,	354	29
Salem Athenæum, per agreement,	300	
Salem Athenæum, service of librarian,	50	
Annuities (with legacies),	160	
		<hr/>
		4,737 96
Income short of expenses,		332 78
Received legacy from estate of Martha G. Wheatland, . . .	10,000	
" extra Dividend Pepperell Manf. Co. Cr. same account, .	800	
" legacy from estate of Esther C. Mack,	4,000	
		<hr/>
		14,800
Investment of legacy of M. G. Wheatland,		10,008 25
Balance on hand at close of account,		4,458 97
		<hr/>
		\$14,800 00

May 16, 1887.

Respectfully submitted,

GEO. D. PHIPPEN, *Treasurer*.

Examined and approved,

R. C. MANNING, *Auditor*.

The above legacies increase the interest-bearing funds of the Institute to about \$50,000, exclusive of the cost of the Daland House, and its improvements.

The Institute has a right to be congratulated on the success of the past year as well as on the bright prospect for a prosperous future. The new building so long hoped for is now ready for occupancy and will, it is believed, fully realize the anticipations of the friends of the project. It is the intention of the Directors to open the building for the inspection of members that they may see for themselves the new house which the liberality of their friends has made it possible for the Institute to purchase. Already an increase in membership shows that the public is ready to encourage and sustain the society in its new departure and a much larger accession of members may be expected as the increased advantages, which the new building enables the Institute to offer, shall be made known.

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BULLETIN

OF THE

ESSEX INSTITUTE.

VOL. 19.

SALEM: JULY TO DEC., 1887.

Nos. 7-12.

ON THE SANTHALS, A SEMI-BARBAROUS TRIBE OF NORTHEASTERN BENGAL.

BY DR. SAMUEL KNEELAND.

WHEN in Copenhagen in 1885, I had the opportunity to see some photographs of the Santhal tribe, and afterward obtained possession of some ornaments worn by the Santals, a tribe of northeast Bengal, before their conversion to Christianity by Messrs. Børresen and Skefsrud of the Danish mission, established and successfully carried on by them at Ebenezer station, in the hill districts to the northwest of Calcutta, from the year 1867. Before describing these specimens a brief account of the character, manners and customs of this people, as obtained from Danish missionaries and English officers, and acquaintance with their race in Ceylon, may be interesting.

The Santals are probably from the same stock as the Kharwars, an aboriginal race which, after long wanderings in the highlands of Asia, came to India many thousand years ago. They seem to have been the first dwellers in India, but were followed by degrees from Central Asia by many other peoples, of whom the Hindoos were the most powerful and best known. Colonel Dalton (Ethnology of

Bengal, Calcutta, 1872) divides the aboriginal, non-Aryan tribes of Bengal into two great sections: (1) the Dravidian, who speak a language allied to the Tamulian, and (2) the Kolarian, whose language is like that of the Santhals, Mundas, etc., the latter coming as he believes from a remote northeastern region, and many of them now Hinduized. This would place the Dravidians in the south, and the Kolarians in the north of India, but many are of opinion that they were originally the same stock, separated by invading races, and modified in language, characteristics, and customs by admixture with other tribes and different surroundings; in this view the Santhals may have belonged to the Kharwar stock, which has become much Hinduized, and to which they are related even now by physical characters and customs, and yet be also related, more remotely in time, to the southern Dravidians.

They dwell in the northeast corner of Bengal, among the Vindhya mountains, and their country is called Santhalistan. The river Ganges flows around its eastern portion, and the city of Calcutta is about one hundred and thirty-five miles to the southeast of their present central home; two railroads pass through the country, yet from their hilly position, they are quite outside the limits of European civilization.

They occur sometimes in considerable numbers, but usually in small communities, in a strip of Bengal extending about 350 miles from the Ganges to the Baitarni, the Hindoo Styx, bisected by the meridian of Bhagalpur, or 87° E. long. and 23° to 25° N. lat. In the present Santhalistan, their chief centre, are now over 200,000, and their total population is at least three millions. The Damuda river, highly venerated by the Santhals, empties into the Hoogly, or west branch of the Ganges, not far from Calcutta.

During an insurrection in 1854 against the Hindoo and other money-lenders, who were rapidly obtaining possession of their lands, they found themselves arrayed against the English; the insurrection was suppressed after much bloodshed, and they were colonized in their present locality, the Santhal Pargana district, under a better administration, and with a partial restoration of their old form of self-government. Fond of the forest and the virgin soil in their wild state, they remove from a cultivated region to the woods again; hence their traditions, though pointing to remote antiquity, are rather obscure and incoherent. Modified by intercourse with surrounding tribes, and recently by Christianity, they still have many old practices, and preserve the language which probably prevailed about the Ganges in pre-Aryan times.

They came to their present localities about one hundred and twenty-five years ago, harassed and driven from place to place by the Hindoos, who, it is said, gave them in derision the name of Santhals, from the word *sandal*, a foot sole, implying that they were fit only to be trodden under foot, which has truly been their fate for many a day. Another derivation of their name is that, in their wanderings they settled for a time at Saont, the present Silda, and hence were called Saontháls, Santháls.

As tribe after tribe invaded India, some from the north-east and some from the northwest, at last came the Hindoos, thoroughly hated by the Santhals, who subjugated all the others until they themselves had to submit to the English, now the masters of the country, who entered India from the sea, enriching themselves enormously without exhausting this wonderfully favored land which, though almost as large as Europe, forms only a small part of the vast continent of Asia; its inhabitants number some 200,000,000, for the most part Buddhists, Brahmanists and

Mohammedans. The Hindoos are about four to one of the Mahommedans, who are the descendants of the old Moguls or Monguls, abhorring the religion of the Hindoos, and most numerous in the eastern districts; the Hindoos predominate in central India, and the aboriginal stocks in the hilly districts of the north, the southern portions, and Ceylon. At the beginning of the Christian era Buddhism prevailed, but was largely supplanted by Brahmanism after 500 A. D. About 1590 the country was conquered by the Mahommedan emperor Akbar, and became a part of the Great Mogul empire, with a mixture of the three religions, though chiefly Buddhist. Since 1757 when the native ruler was defeated by Lord Clive, it has been under the rule of the English. Most of the pre-Aryan tribes, originally pantheists, had been more or less modified in their religion by their successive conquerors.

The Santhals, like the Israelites, are divided into twelve tribes, and each tribe into twelve stocks or families; every child on the fourth day after birth is made a member of its family by a pagan baptism, with the sprinkling of water and the juice of fruit, in the presence of the people.

Their land is a rather sterile mountain region, and therefore agriculture and the raising of cattle, which should be their chief occupations, are not extensively pursued. On the plains and in the valleys there are three seasons: 1. The *hot* from the middle of March to the middle of June, with a heat of 100° Fahr. in the shade, sometimes rising to 130°, when hot winds blow over the land. The latitude is about 25° N.; 2. The *rainy* season, after this, until into September, when the air, especially in the wooded districts, is sultry and unhealthy, and poisonous vermin swarm; 3. The *cool* season, from September to March in which occur the harvests. The first crop, that of maize, is gathered at the end of the rainy season, in the middle

of September ; the only other crop, that of rice, about New Year's time. The crops depend on the rain ; if this comes not, want attacks this improvident people, and should a drought follow the next year, there is a famine. Although the land is poor, it is not without beauty ; the forest-covered mountain slopes, the deep ravines and rushing torrents give each locality much attraction to those who love grand wild Nature. There is not a little forest richness, dense thickets, and magnificent semitropical vegetation ; there is a multitude of noisy, many-colored birds, and many songsters. Wild animals in abundance dwell in the thickets, and the tiger is a terror to both man and beast. The trees change their leaves twice a year, after the rainy season, and before the hot one, or in September and March.

The Santhals once had a far higher culture than at present ; this can be traced in their language, which is uncommonly well developed, rich both in words and in forms. Their many old fables and songs indicate manners and customs and wise sayings, transmitted orally from generation to generation, pointing both to a language and occupation of the country before the Aryan invasion.

The religion of the Santhals, like that of all rude peoples, was a species of pantheism, afterward modified by the tenets of Buddhism, Brahmanism, Mohammedanism, and, during the last century, of Christianity. According to their most widely-spread tradition, Thakur, the almighty, omniscient, all-seeing, and all good God, who dwells in Heaven, above the stars, is the creator of all good and bad men, and of devils. At his command the earth came out from the waters, and became the abode of animals which he formed from it. At last he made from two clods of earth the first pair, the man Hadow and the woman Aio, whom he made living by blowing into their nostrils. They lived for a time in happy innocence, and were not ashamed

of their nakedness; but this happiness was destroyed by the evil spirit, Marang Baru. He announced himself as their grandfather, and promised them still greater happiness from the use of an intoxicating drink, which he taught them to make. It is singular that, in this ancient tradition, an intoxicating drink should be considered the root of all evil to man, for all experience since has shown that it is a principal one. By degrees they gave themselves and their progeny up to this drink, and in their impurity the latter sank to such a brutal condition that marriage was done away with; and when Thakur called them to account for their sins, they so hardened themselves against his voice, that he resolved to destroy the depraved race. There came a rain of water or fire (the tradition varies in this respect), and all the race perished, except a single good man and his wife, who were saved by Thakur's foresight, with some animals, in a mountain cave (Harata). One cannot fail to notice the resemblance here, both in name and events, to the Mosaic Adam and Eve, the temptation by the devil, the fall, the destruction of the race, and survival of a pair on Ararat; but which tradition is the anterior, it is not easy to decide. From these two survivors sprang the present race of men. On the plain around Harata, they dwelt and built for a time, but as their numbers multiplied they spread to the north and the south, the east and the west, and could not in their different zones preserve the same language. The fathers of the Santal branch went to the east, and came after many years to an insurmountable mountain, which prevented further progress. Suffering from hunger, in their distress, they called to the mighty spirit, who they thought dwelt in the mountain, and was the cause of their misfortune. In the morning the sun shone through a narrow pass, which they had not discovered, so that they found their way out; but

from this time they worshipped both the beautiful sun and the wicked mountain spirit, Marang Baru; and afterward many other false beings or "Bongas," with which by degrees they invested all existing things, trees, stones, etc. This account of the religion of the Santhals, I take from the records of the Danish mission in Ebenezer, Bengal.

Col. Dalton (Ethnology of Bengal) mentions a tradition which says that "a wild goose coming from the great ocean, alighted and laid two eggs, from which came out a man and a woman, the progenitors of the Santhal race. As they increased in numbers they changed their locality, and were called Kharwars; and they at last came to a place where they remained for several generations. Fleeing from a powerful enemy, they reached the 'great mountain', Marang Baru, which interposed its mass in the way of their pursuers, and thus they became worshippers of Marang Baru, sacrificing to him goats; after many wanderings they came to their present location."

Some think that the "wild goose" was a white-sailed vessel which brought them across the bay of Bengal from the southwest. They know that their sacred Damuda river flows into this sea; on this explanation, they probably first landed on the east coast of Bengal, going afterward westward and northward; their traditions seem to indicate that they came from the south.

They have no single great chief around whom they gather, but live scattered in villages, each of which forms a little whole in itself. Each village has five officers: a head man or *manjhi*, a supervisor of youth, a herald or crier, a town priest and a country priest. The first two have each an assistant, making seven in all, but these are closely watched by certain townsmen chosen for the purpose. These officials, with some of the principal men, constitute the local court of justice, from which a case can be carried to a higher tribunal, presided over by the

highest magistrate in the *district*, the so-called *pargana*. The last has under its jurisdiction thirty to sixty villages, and forms a strong, connecting link between them. Many heads of towns and other chosen men have seats in this superior court; but over these is the voice of the public assembly, which has in its hands the final decision, like a supreme court. These customs indicate a former culture far superior to their present, though they have always preserved a kind of representative or self-government.

Their features are not sharply-marked, and there is a tendency to fulness of feature and of body. The face is almost round, with cheek bones moderately prominent; eyes full and without obliquity; nose not prominent, but broad and depressed; mouth large, with full and projecting lips; hair straight, coarse and black; they are negrooid in color and appearance, and rarely more than five and one-half feet high. The females have small hands and feet, and peculiarly large and lustrous eyes which the ancients would call "ox-eyed," a compliment which they paid to the goddess Juno.

They have comfortable homes, huts with walls of mud, and floors well raised, to avoid dampness and creeping vermin. The houses are often surrounded by a kind of veranda of bamboo lattice work, covered with trailing vines and flowers; they are neatly kept and gayly colored with stripes of red, white and black, by the use of native clays and charcoal; they have partitions, securing privacy and decency. They prefer to have their villages to themselves and do not like foreigners, especially Brahmans; but as they clear and cultivate the land, the crafty and enterprising Hindoo gets admission, and, finally, obtains the mastery over their honest simplicity, and, sometimes, by offering higher rents to the government, ejects the Santhal.

When a child is about ten years old, he is taken into

the tribe by the branding of three marks. When grown he marries of his free choice, but woe to him if he breaks any of their marriage customs, for his life is in danger, unless his father pays a heavy fine for him. In families the father gives counsel and instruction in the customs of old times, for they hold in high honor the memory of their ancestors; grown-up sons continue to live under the authority of their parents, and many young families dwell together under one roof in their father's house, cultivating the ground in common. The oldest son is always named after his grandfather, and the others after other relatives; they adopt as a rite the tonsure of their children. There is great freedom between the sexes, and the old people have the utmost confidence in the virtue of the young; all travellers agree that their women are remarkably chaste. Marriage is generally arranged by the parents, though many are love matches and happy ones. The average price of a girl is five to six rupees, about \$2.50 to \$3.00, with presents of cloth to her parents. The value of a young girl may be as high as \$4.00 or \$5.00; a divorced woman is worth \$1.50, and a widow seventy-five cents to a dollar, according to age and charms. A boy is marriageable at sixteen, and a girl at thirteen years. The day for the marriage being fixed, a knotted string indicates the number of the days the bridegroom must wait; he unties one knot each day, and when the string is clear, he and his friends set out with noisy music for the bride's residence. No priest officiates, the meal eaten socially by the groom and bride being the chief part of the ceremony at a Santhal wedding, and, as they have been obliged to fast all day, the appetite is generally good, and this feature of the occasion well performed. She thus ceases to be a member of her father's tribe, and becomes one of her husband's family. The wife is usually kindly treated, and

should the husband, for any good reason, take a second wife, the first always remains the head of the domestic household. To appease the Bongas or evil spirits, a lamb is sometimes offered as a sacrifice; this is killed by an axe, and the propitiatory fire is made to burn by blowing upon it through ox-horns. Their principal food is rice and curry; knives, spoons and forks are unknown, and they use only their fingers; it would be a mistake to lead them to adopt European customs in eating.

They are remarkable performers on the flute. This they make of bamboo, not less than an inch in diameter and two feet long; it has six holes, and is played by four fingers of the right, and two of the left hand; its tones are deep and rich. They are also good singers and dancers, skilful makers of intoxicating drinks, and have very jolly times. There is always an open space for dancing in front of the house of the head man of a village, where they dance evenings to the music of their flutes and drums of burnt clay. In one of their chief dances, the *Rasa*, the girls are decked with flowers and tinkling ornaments, and the young men with garlands and peacock feathers — taking hold of hands, and so close together that the breast of the girl is in contact with the back of the man next to her. Thus they go round in a great circle, all their legs moving as if they belonged to one creature, the feet falling in such perfect cadence as to put to shame the best drilled soldiers. The musicians are in the centre, fluting, drumming, and dancing, forming the axis of the movement, the dancers singing in response, just as described in the Vishnu Purana in the "dance of Krishna." Usually men and women do not dance together, but always in a row, forward and back, and around the musicians. They make no cloth, but obtain it from their neighbors, traders, and the English. The women wear an ample covering of

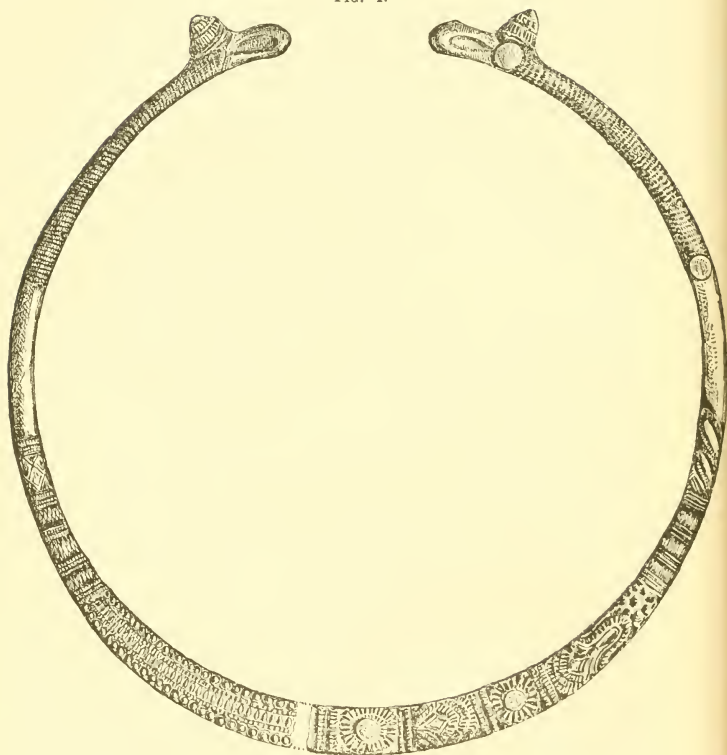
cotton-cloth, six yards long, with bright red border; one-half of this forms their lower garment secured at the waist, but not impeding the free action of the limbs; the other half is passed over the left shoulder, hanging down in front, leaving the right shoulder, arm, and part of the breast uncovered; it is not used as a veil. With young girls the head is generally uncovered, and the mass of hair gathered into a large knot at one side of the back of the head, ornamented with flowers or tufts of colored silk. Of ornaments they are extremely fond, especially the women, who wear many kinds of amulets on strings around the neck, arm-rings, bracelets, ankle, finger, and toe-rings, which render domestic work very difficult and often painful. Since their conversion, almost all of these ornaments have been discarded, and they naturally wonder at the jewelry worn in their midst and in church by the European ladies of the mission and others, and innocently ask "have they been baptized?"

I was fortunate enough to secure some of these barbaric ornaments, now unused except in the districts beyond the influence of the mission. They are very well made, of artistic designs and decorations, attesting considerable skill in the working of metals, and no little knowledge of the fine and mechanic arts of their more civilized neighbors; this is probably not due to imitation, but is a remnant of their former refinement and culture, perhaps from pre-Aryan times.

FIGURE 1. A *neck-ring* of brass, weight 6 ounces; diameter inside $6\frac{3}{8}$ inches, outside 7 inches; circular; open behind for $1\frac{7}{8}$ inches, flattened in front, cylindrical above, and each end terminating in a rounded point surmounted by a knob. It is chased very prettily on nearly its whole extent, with different patterns on the two surfaces. Where it came in contact with the sides of the

neck, the ornamentation is either absent, or worn off by friction.

FIG. 1.



Under surface.

NECK-RING. $\frac{2}{3}$ SIZE.

Upper surface.

These are worn by both sexes, and are so rigid that they must be put on when the wearer is so young that the ring

can go over the head; it cannot be removed from the adult except by breaking or filing it. It is astonishingly like the neck-rings worn by the Celtic, German, and Scandinavian warriors of antiquity, and reminds one of that around the neck of the "Dying Gladiator," who was probably a Gallic prisoner of war.

Bracelets. FIGURE 2. A closed bracelet of brass, weighing $1\frac{5}{8}$ ounces, widest diameter $2\frac{1}{4}$, narrowest 2 inches; thickness $\frac{1}{4}$ to $\frac{1}{8}$ of an inch. At the point of closure, on the back of the wrist, are two symmetrical knobs; it is neatly ornamented, and in many parts worn smooth by use. It must have been put on when the hand of the wearer was small enough to pass through its rigid opening.

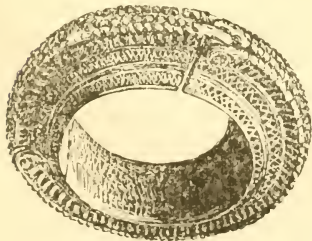


FIG. 2.

BRACELET. $\frac{3}{4}$ SIZE.

FIGURE 3. A brass bracelet, weighing 3 ounces, extreme width outside $2\frac{7}{8}$ inches, circular opening for wrist $1\frac{3}{4}$ to $1\frac{7}{8}$ inches in diameter.

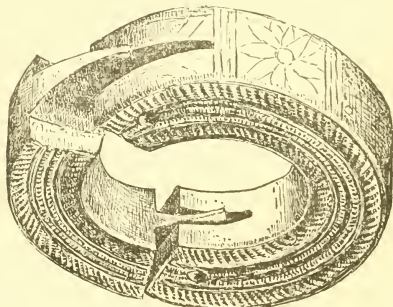
FIG. 3.

BRACELET. $\frac{3}{4}$ SIZE.

The external rim, $\frac{1}{4}$ of an inch wide, has three parallel rows of dots in longitudinal series, three dots in each transverse row, so that a definite pattern is followed: from this rim, the metal is symmetrically bevelled in two series of chain work ornamentation, precisely the same above and below, divided by a plain groove; the external rim

is separated from the bevelled portion by a circular series of sixty-four oval perforations, making it lighter and more ornamental; the portion in contact with the skin is $\frac{3}{4}$ of an inch wide, and seems to have been lined with leather, now hardened, which was greased to prevent excoriation. One-third of the bracelet may be opened by a tongued joint for introducing the wrist, fastened by a wooden or metallic peg, so that it could be put on and off at will. Its lightness, symmetry, accurate proportions on the two surfaces, delicacy of the ornamentation, and well fitting

FIG. 4.

BRACELET. $\frac{3}{4}$ SIZE.

hinge, show a great skill as well as taste in the working of metals.

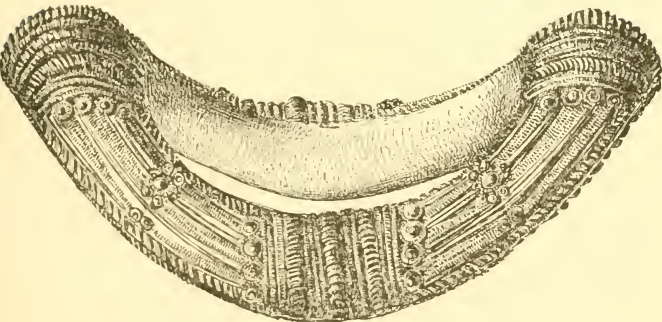
FIGURE 4. A solid brass bracelet, weighing $16\frac{1}{2}$ ounces, $3\frac{1}{8}$ inches in diameter outside; opening for wrist, circular, $1\frac{3}{4}$ inches, thickness $\frac{3}{4}$, and width $\frac{7}{8}$ of an inch. Quite smooth on the inside, and on the outside, where the ornamentations are almost obliterated by use; the ornamentation consists of concentric rings, three in number, of oblique interrupted lines, parallel grooves and raised dots the same on both external surfaces. On account of its weight it could not be worn constantly with comfort; to

enable the wearer to remove it, about $\frac{1}{4}$ of it can be opened by means of a triangular well-fitting long tongue, fastened by a peg of metal at each side.

Anklets. The most extraordinary ornaments worn by the females are the anklets of which I have two, one for an adult and one for a girl.

FIGURE 5 is an elliptical brass ring turned up at each end, and weighing $2\frac{1}{2}$ lbs. ; longitudinally it measures $6\frac{1}{2}$ inches, and transversely 4 inches ; the aperture which encloses the foot is in the same directions $3\frac{1}{2}$ and $2\frac{1}{2}$ inches.

FIG. 5.

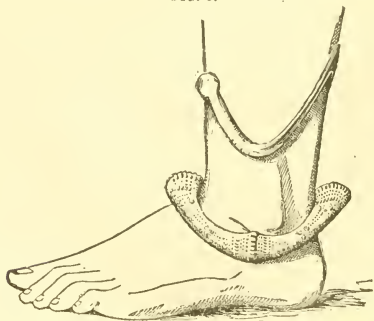
ANKLET. $\frac{1}{2}$ SIZE.

The part which comes in contact with the skin is smooth ; the upper and outside surfaces are ornamented with raised rosettes, continuous and dotted lines, and various prominences longitudinal and transverse ; the higher anterior and posterior portions are most highly ornamented, both above and below, and are nearly alike ; they seem to be casts, finished by hand. This is evidently for an adult, and is an inch in diameter, or three in circumference, at its smallest part, and a little thicker in the middle and at the ends ; design artistic.

FIGURE 6 shows the anklet for a young girl as worn upon the foot. This appears more like whitish bronze; it is $4\frac{3}{8}$ by 3 inches, weighs $11\frac{3}{4}$ ounces and the opening for the foot is $2\frac{3}{4}$ by $1\frac{3}{4}$ inches; it is of the same shape, and with almost the same ornamentation as the larger one, and the same characters as to proportions and design. The patterns for this ornament seem to have been few.

The present specimens, as are all before and afterward alluded to, are of bell-metal; no Santhal woman could do without these weights on her limbs; if she could not have

FIG. 6.

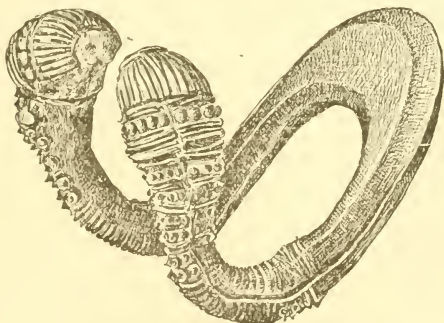


FOOT OF CHILD, SHOWING THE POSITION OF THE TWO ORNAMENTS.

them of silver, she would have them of brass; they delight to clink them together in their barbaric dances. These anklets, though usually slipped on without difficulty over the heels of the young girl, where they remain till she outgrows them, are sometimes forced on with great violence by the native makers, who place at first moistened leather over the heel and instep to prevent excoriation; as the weight on each foot, with the article next described, may be four pounds, it happens not unfrequently that the hard heavy metal cuts into the skin, causing great pain;

but it is all borne cheerfully for fashion's sake. With such an apparatus the Santhal woman was so manacled and handcuffed that she could do little more than carry it about ; one hand had to support the other, or both were rested on the hips ; she walked with difficulty, and was liable to accidents in the thickets from her neck-ring. Once on, they can only be removed by the file, and in their wild state to be replaced by larger and heavier ones. When Christianized they are glad to have them filed off, and then can do twice

FIG. 7.

CLASP WORN ABOVE THE ANKLET. $\frac{2}{3}$ SIZE.

the labor of their heavily adorned heathen sisters. They have been known to carry thus thirty pounds, but usually about twelve. The anklets are worn *below* the malleolar prominences, and are called *banki*.

Clasps or buckles for the leg above the anklet. Of these I have two. FIGURE 7 is one for an adult, weighing $1\frac{1}{2}$ pounds. The one for a child weighs $3\frac{1}{4}$ ounces, both of bell metal. These are the most singular of their ornaments, and had we not the drawings of the missionaries, it would be difficult to make out how they were worn. FIGURE 6 shows how these singular ornaments are worn.

One would at first think it was placed under the heel, coming up behind, under the ankle-ring; but, on the contrary, it is worn above the anklet, $2\frac{1}{2}$ to 3 inches. It is shaped something like the letter U, and is bent almost at a right angle; its two halves are precisely alike, and its upper posterior part is flattened from behind forward and quite smooth, as its surfaces come in contact with the skin of the posterior parts of the leg, especially when the limb is swollen, as one would think it must inevitably be. The anterior part consists of two branches with their usual ornamentation of dots, rings, and interrupted lines, rough

FIG. 8.

TOE-RING. $\frac{3}{4}$ SIZE.

on the outside but smooth on the inside, where they touch the skin; it is kept in place by two prongs, movable or permanent, with conical points turned inward, which keep the buckle, if it may be so called, in place and prevent its slipping backward from the limb; the posterior ring is complete behind, the anterior nearly so, but the ornament is partially open in front; with the movable points, it may be usually removed, but it must be an instrument of torture which only the fashion could render endurable. It will thus be seen that behind and on the sides of the leg is a double series of brass rings, rough and heavy, often eating into the flesh, but the shin is free in front though severely pinched on the sides. The small specimen, represented upon the foot in FIGURE 6, shows that children wore the same ornament. The illustrations alone can show the peculiarities and the method of wearing these singular leg ornaments.

FIGURE 8 is a toe ring weighing 1 oz., carrying a double bell. This is used in dancing, of which the people

are extremely fond; they delight to hear the tinkling of these bells, and the clicking of their anklets and buckles as they strike their legs together in the Santhal cracovienne.

They wear rings at the elbows, ear-rings and nose-rings, even the children; they also use a kind of castanet, with which they mark the time in their graceful, exact evolutions. The women even indulge in the practice of dyeing their eyebrows, and the men often bang their hair. In fact, there is hardly a fashion of modern male or female ornamentation, which is not borrowed from and a relic of barbarism.

Life must be pleasant to the Santhal, cultivating his land, dancing to the music of his flute, carousing at the harvest festivals, and going in convivial parties to the hunt; in the last they are ardent and skilful, though they generally avoid the tiger and the bear. Their native weapons are the bow, the spear, and the battle-axe, the last of which they throw with great force and accuracy. They make excellent police for the jungle districts, as they are proof against malaria.

In the disposal of the dead, they in some respects resemble the Hindoos; the body is burned on a pyre, and two pieces of bone from it are taken to the Damuda, their sacred river, to be carried out to the "great ocean," and there be gathered to those of his fathers; from these bones is to be made the new body, in which the deceased dwells, and continues life in the other world.

Once a year they collect in vast numbers for a hunt of extermination of wild beasts; they hunt by day, and at night hold their feasts and councils. Every man, who can support himself, or, as they say, who can stand on his own legs, has the right to vote at their meetings.

According to Dr. Caldwell, the Indian populations have

been : 1. The *Kolarian* (or Kerwars) the earliest, who entered from the northeast the mountain region of Assam and Thibet ; 2. The *Dravidian*, who came from the northwest, from the direction of Afghanistan, across the Indus, who went to the extreme south, either voluntarily or driven by other tribes following the same course ; 3. The *Scythian*, non Aryan race, from the region of the Black Sea, who formed with the Sanskrit the mongrel Prakrit dialect of North India ; 4. The *Aryan* invaders or Hindoos. These races probably fought against each other, until the Aryans conquered, driving the Kolarians to the mountains where they maintained their independence, the Dravidians submitting and retiring southward. Both these races are doubtless offshoots of the pro-Malay stock, from which Mongolians, Malays, and many so-called Aryans are supposed to be descended in remote prehistoric times. According to their sacred Rigveda, the Aryans are believed to have come in about 1500 B. C., from Persia, and after a long and severe struggle to have vanquished the Kharwars or Kolarians. In the north, then, were the Kolarians or Mundas, to which the Santhals belong, avoiding extermination by retreating to the hilly regions to the northeast, on the southern flank of the Himalayas ; the Dravidians were regarded by the Aryans, at least five centuries before Christ, as the aborigines of South India. To these belong the Tamils or Tamulians, the Klings, and the Cingalese, all of whom I have seen in Ceylon and Singapore. The Tamils are about 10,000,000, mostly in East Ceylon, great wanderers and excellent seamen, and from whom the name Coolie (*Kuli*, or *hire*) is derived—meaning a person who will work for hire. The Telingas or Klings are about 14,000,000, and are most common in East India, taller, fairer, and equally energetic ; both are more bearded and with better heads than the Mongolians,

and come nearer to the Aryan races ; but Chinese admixture has greatly modified the lower classes of all these races, so that it is difficult to find one of pure blood.

It is impossible to determine how much the Dravidian element enters into many of the Kolarian tribes ; it is certain that many of the Hinduized aborigines are Dravidian, characterized by speaking the Tamil language, and numbering over a million in Bengal alone ; they also have in their language Sanskrit elements, especially among the more civilized.

I will not discuss the point whether the so-called Dravidians have any Mongolian admixtures or characteristics, as I think the whole race in question must be dated back as very ancient branches of a pro-Malay common stock. It is probable that, after the separation of what afterwards became what is styled the Mongolian stock, in the mountains to the north, these races mingled together and it is certain that in modern times they have been mixed with the Aryan Hindoos.

I recognized a national resemblance between the degenerated Santhals, both physically and mentally, and the present inhabitants of eastern and southern India, and Ceylon, and by their wanderings, in Singapore. In the last named place I saw the Telingas or Klings, who, though dark as negroes, have very fine heads and bearded faces, non-negroid black hair, flashing eyes and pleasing features ; but the body and limbs are poorly developed, as they prefer house service to hard out-door work. The men often wear ear-rings and bracelets, and are savagely handsome fellows, but good-natured and industrious. The women have a more barbaric look, wearing armlets and anklets, jewelry in the lobe and top of the ears, ornaments in each wing of the nose, and often a ring in the middle cartilage of considerable size ; you see among them many

handsome faces, and the fore-arms are often elaborately tattooed. The children are uncommonly pretty and both sexes go nearly naked until the age of five or six years; the men have contracted the sedateness of the continental Malay, among whom they live, and have not the jollity of their Ceylon and Madras brethren and the Polynesians.

The Ceylonese men carry their hair straight back from the forehead, put up behind in a knot like a woman's and kept in place by a tortoise-shell comb; it is sometimes allowed to hang down the shoulders. When covered at all, the head bears a small turban or many colored straw hat. The dress is loose and flowing, as in the Santhal's; the features are handsome. They are considered as of less mixed stock than the Tamils or Tamulians, and are very dark. The children are singularly pretty, and the sexes hard to distinguish even by the dress, until the beard begins to grow. The Tamil boatmen are tall and well-formed, and carefully shave their scalps and faces. The Coolies dress simply in a waist cloth, but the better classes wear folds of white linen or cotton, rolled around the body and carried over the left shoulder leaving the right arm free. Females of all ages wear bracelets and anklets of silver or other metal, but not the nose and ear ornaments of the Klings. They chew betel, which the Santhals do not. These so-called Dravidians have adopted many of the customs and ideas of their Mahommedan and Hindoo conquerors, while the Kolarians, and the Santhals especially, driven to the mountains, and practically independent, have preserved their traditional characteristics, and may be cited as the best specimens of the pre-Aryan, probably aboriginal, inhabitants of India, and very likely as coming the nearest, of any tribes now living, with the Juangs, to the pro-Malay stock.

I am of opinion that sufficient attention has not been

given to this pro-Malay type of man, the probable ancestor of most if not all, the nations of Asia, Europe, Africa and Oceanica, and the derived races in the New World. Color of skin and character of hair I regard as simply a matter of climate, acting not during centuries, but many thousands of years; I believe that the first man had a dark skin, and that crisped hair is an evidence of great antiquity in a *tropical* heat, and not of a distinct origin. Why did such an acute observer as Dr. Charles Pickering regard the Japanese, the old Californians, the natives of Mexico and the isthmus, and some of the American Indians (Cherokees and Chippewas) as Malays? I have noticed the same in Mexico (Acapulco, Manzanillo) and in Central America. A consideration of these pro-Malay races, and of the changes in the relations of land and water, which there are good reasons for believing have occurred during this age of man, would explain, or at least throw light upon, the early migrations of man, and show how unsatisfactory are all classifications of the human races which take into account only those known to history; the border land between tradition and history is well worth examination. In forming an opinion on the aboriginal tribes of India, in the neighborhood of one of the cradles of our species, we must go back in time many thousand years before the Aryan occupation, and before *this* branch, or *Mongolian*, or *Malay*, existed as such; and I feel inclined to return to the old idea that all the nations of men have originated from a very few pairs, if not a single one. Whether created, or evolved from an anthropoid ape, matters not for this hypothesis, and both origins require a first appearance in a climate at least sub-tropical, where clothing for protection would be unnecessary—where food grew spontaneously—and where caves, either natural or artificial could be found or made in a soft and stratified, and not primary, geological for-

mation. I believe in the existence of man for tens of thousands of years, and that he first appeared in the neighborhood of Central Hindostan, on the southern slopes of the Himalayas, or in some island in the Arabian gulf or bay of Bengal, the Lemuria of Sclater now sunk beneath the sea—in other words, in or very near the latitude and longitude indicated by many old traditions; that, if he appeared by evolution, the missing links are many, for the gap is very great, between what we know of the highest apes and the lowest man of whom we have any evidence. I suppose that, whether created or evolved, most would admit that primitive man was comparatively low in his mental and moral development; though of course the theological assumption is that he was created “a little lower than the angels,” which is perhaps the only one admissible on the creation theory. We know, in fact, that man’s condition has not always been one of growth; history shows many remarkable and indisputable cases of degradation; the Santhals are a case in point. I will only hint at the belief that the mysteries of Peru, Central America, Mexico, and the mound-builders (perhaps), of the pyramids of Egypt, the temples of India, and the gigantic structures of Easter island and the Ladrões, point to immensely distant periods of time, and migrations rendered possible, and now apparently impossible or improbable, by great geographical changes in the earth’s surface; and that these archaeological secrets will never be revealed to him who studies solely man as he exists actually or in history, or by any marks he has left behind him, except language.

REPTILES AND BATRACHIANS FROM TEXAS AND MEXICO.

BY SAMUEL GARMAN.

THE collection from which this notice is taken was made several years ago by Dr. Edward Palmer for the Museum of Comparative Zoölogy. It contained twenty snakes, nineteen lizards, three turtles, thirteen frogs and toads and one salamander; in all, fifty-six species, represented by several hundred specimens. Especial interest attaches to it, because of the pains taken by the doctor to secure series of young and old, and the care with which he fixed the localities and the dates of capture. The scarcity of new species or varieties is accounted for by the fact that the same regions had been visited by the collectors of the Mexican Boundary Survey. Yet, although the ground had been so well traversed before this collection was made, it contains a number of forms not previously included in recent faunal lists of their respective localities.

CROTALUS ATROX *Baird & Girard*, 1853.

On a specimen from San Pedro, Mex., there are twenty-five rows of dorsals, one hundred and eighty-one ventrals, twenty-six subcaudals, thirty-seven transverse blotches on the back, and six bands of black around the tail. Another from Monclova, Mex., has twenty-five rows of dorsals, one hundred and seventy-eight ventrals, twenty-five subcaudals, thirty-two blotches on the back and five bands of black on the tail. The following notes on the

rattle and rate of growth are made from this species and also from others not found in the Palmer collection.

At birth, the rattle is represented by a single button, the basal piece. As the animal grows, this button is displaced by another which has grown within it and crowded it back, but which it now, being the first ring of the rattle, clasps rather loosely. The new button is crowded back in similar manner by its successor, and so on, each segment of the rattle becoming a ring after a period of service as a button. The ring which was the first button is the smallest and is easily recognized by its shape; not having been formed inside another, its angles and curves are much less abrupt. Until a certain stage is passed, each ring is smaller than that formed immediately after it. Usually, from the first ring to the seventh, the rattle, as a whole, is tapering; from the seventh, the rings are more equal, and the edges of the organ are nearly or quite parallel. If the rattle is much tapered, it is evident that the snake to which it belongs is comparatively young; on the other hand, if none but nearly equal rings are present, we can only say the taper portion has been lost and that the age of the snake includes sufficient time to form both the taper and the parallel portions, with a possible addition for lost rings of the latter. During the time of most rapid growth the rings are most unequal; those formed afterward make up the parallels. Consequently, the separation of the species, as advocated by some, into two groups, one of which shall contain those with tapering, and the other those with parallelogrammic rattles is an impossible one. Of *C. atrox*, the young are less than ten inches in length at the time of extrusion. Specimens on which the first ring has appeared are about double the length. Others with a larger number of rings prove that this rapid increase is not kept up, but that year after year the rate

decreases gradually, until in old snakes the addition during the time of producing a ring is hardly perceptible. In the time from the completion of the fifth ring to that of the sixth only a couple of inches were added on our examples.

My means of determining the time required in the production of a ring have not been wholly satisfactory. Living individuals certainly acquired a ring at the time of sloughing in the spring. Of about seventy alcoholic specimens collected between May and September each of three, secured late in the season, shows a new button well under way; proving that at least in cases a ring is added in the fall. The general opinion is that only one ring is grown each year. To take one per year as the ordinary rate gives *C. atrox*, from Dr. Palmer's specimens, about seven years in which to finish the strongly tapered portion of the rattle, becoming full grown in a total length of not far from three feet six inches. An individual four feet in length has seven of the equal rings, having lost all the tapering; this, at a ring per year, would indicate an age of fourteen years or more. Other snakes slough both in spring and fall. The few observations I have been able to make at the proper seasons go to show the rattlesnakes possessed of the same habit. If this be so and a ring is gained at each sloughing, as seems to be the case, the number of the years of the snake will be but half as large as that of the rings. The male in this and the following species is generally the smaller for the same number of rings.

In connection with the foregoing a number of specimens of each of several other species have been examined, with a view of determining how much stress may be placed on the conclusions suggested above. On account of the great amount of individual variation from sex, locality, food, etc., it is necessary throughout to speak in terms of averages.

Crotalus confluentus Say, 1823.

In complete rattles the taper portion includes no more than seven rings, and the average size of snakes reaching this number is less than three feet, showing the species to be smaller than the preceding. A fourteen-inch specimen has one ring and the button; a twenty-three inch, taken up in the mountains, has seven rattles, of which three show comparatively little taper, possibly evidence of short allowances. Fourteen specimens.

Crotalus horridus Linn., 1758.

The pronounced taper appears to include the eighth ring in a couple of cases. On very large specimens with long series of rings it is quite evident there is taper in what from a small number of the rings would be called parallel; this is seen plainly on measuring rings at a distance from each other. Individuals with complete series of seven rings all tapering measure from two feet eight inches to three feet three inches. One, two feet ten inches long, having lost some rings, still has five of the taper and five of the parallel. Another, four feet four inches in length, has lost all but seven of the parallels. The first ring and the button appear on one of nineteen inches. Eighteen specimens.

Crotalus adamanteus Beauv., 1799.

The largest on which we find all the rings taper is three feet seven and a half inches in length. On one of three feet four inches and another of four feet eleven inches the rings form parallels. Four specimens, rattles incomplete.

Crotalus durissus Linn., 1758.

A seventeen inch specimen has not yet grown a ring; a three feet nine inch has nine rings and the button, seven tapering, the seventh to the button parallel; a four feet one inch has seven rings and a button, the taper apparently

extending to the eighth ring; and a four feet six inch has eleven rings and a button, seven rings in the tapering portion.

Crotalus lucifer B. & G., 1852.

On a two feet eight inch individual there are five rings in the parallel and three in the taper part of the broken rattle.

Crotalus exsul Garm., 1883.

A twenty-two inch specimen has eight rings tapering and from the eighth to the twelfth in the parallel. In this case the first was nearly as large as the sixth and the taper is comparatively slight.

Sistrurus catenatus Raf.; Garm. Massasauga.

Young, at birth, measure eight and a half inches. Females reach the seventh ring, or finish the tapering part of the rattle, and become "full grown," at a trifle more than two feet in length, the males at less. A two feet ten inch specimen appears to have reached full size with the sixth ring; the sixth, seventh and eighth showing no taper. Thirteen specimens.

Sistrurus miliarius Linn.; Garm. Ground Rattler.

A young one, how long at birth not known, with only a button, measures six and a half inches. The average size of full grown is rather less than seventeen inches. Sexual maturity is sometimes reached before the tapering series is completed. A gravid female with three equal rings and a button had a length of only sixteen inches. Twelve specimens.

CROTALUS MOLOSSUS B. & G., 1853.

From the mountains of Alvarez, near San Luis Potosi, Mex.

Dorsal rows twenty-five; ventrals one hundred and seventy-three; subcaudals twenty-three. Crown shields rugose; two triangular internasals; two prefrontals; four frontals, forming a quadrangle, with a small scale in the middle. About thirty-two lozenge-shaped blotches on the back, each with yellow margins a single scale in width.

CROTALUS PALMERI var. n.

Monclova, Mexico.

Dorsal rows twenty-three; ventrals one hundred and sixty-four; subcaudals twenty-four. Snout moderately broad; crown flat; two internasals; prefrontals in two transverse series, anterior of five and posterior of four scales; frontals small, smooth; supraciliaries prominent laterally; two anteorbitals, separated from the nasal by two scales; postorbitals three; suborbitals two, posterior separated from the labial by one scale, anterior in contact with the fourth or fourth and fifth labials; labials twelve; lower labials ten; pit surrounded by three scales.

The general appearance of the scales is as if they had been polished, on head and body; the keels are low, and are present on all except the outer row of each side. On the back the color is bluish grey. With the lens the scales are shown to be thickly punctulate with darker. There are no lines, spots or dots on head or neck. Farther back a series of dark spots, of a couple of scales each, is faintly visible on the outer two rows of the flank; the spots gradually become darker until in the posterior half or more of the length they are black. Toward and on the tail the spot lies at the extremity of a faintly defined transverse band. Along the lower part of the side there are evidences of a reddish tint in life. The belly is yellow, slightly clouded or mottled with brownish.

The specimen is only two feet six inches in total length;

in the rattle there are nine nearly equal rings, some having been lost. From this it is evident the snake was full grown and belonged to a small species.

This form is closely allied to *C. tigris* Kenn., in which it is placed as a variety.

SIBON SEPTENTRIONALE *Kenn., sp.*, 1859.

San Luis Potosi, Mexico.

Dorsal rows twenty-five; ventrals two hundred and seven; anal bifid; subcaudals seventy-two pairs; white transverse bands twenty-six on body, ten on tail; total length nine and seven-eighths inches; tail two.

REGINA MESOMELANA *Jan*, 1863.

San Luis Potosi, Mexico.

The dorsal rows are nineteen in each case; ventrals one hundred and forty-nine, one hundred and fifty-five, one hundred and fifty-nine; subcaudals, in the only one entire, sixty-two pairs. On one the lower anteorbital is fused with the loreal on both sides of the head. One has the outer two and a half rows of lighter color; others have a light line on the second and third rows and below it a brown one on the first. The median line of olive brown on the belly varies greatly in width.

EUTÆNIA PROXIMA *Say; B. & G.*

Georgetown, Texas.

Dorsal rows nineteen; ventrals one hundred and seventy-one; subcaudals one hundred and five pairs; total length nine and seven-eighths inches, body seven.

EUTÆNIA MARCIANA *B. & G.*, 1853.

San Luis Potosi, Mexico.

Dorsal rows twenty-one; ventrals one hundred and fifty-

nine, one hundred and fifty-eight, one hundred and seventy-one; subcaudals sixty, sixty-nine, seventy-nine pairs.

San Antonio, Texas.

Rows twenty-one; ventrals one hundred and fifty-two; subcaudals seventy-two pairs.

EUTÆNIA CYRTOPSIS Kenn., 1860.

San Luis Potosi, Mexico.

Dorsals in nineteen rows; ventrals one hundred and sixty-one; subcaudals seventy-seven pairs. On one side the specimen has four postoculars, on the other three. Total length ten and seven-eighths inches, body eight and one-fourth.

SCOTOPHIS LINDHEIMERII B. & G. 1853.

Georgetown, Williamson Co., Texas.

Dorsals twenty-seven rows; ventrals two hundred and thirty-two; tail mutilated. About thirty transverse blotches of brownish on the back, in a reddish ground color; smaller alternating blotches on the outer rows; belly yellowish, clouded with brownish.

Corpus Christi, Mexico.

Rows twenty-seven; ventrals two hundred and twenty-eight; anal bifid; subcaudals eighty-two pairs; two scale pores, thirty transverse blotches on body, fourteen on tail; total length seventeen and one-fourth, tail three inches.

San Pedro, Mexico.

Rows twenty-seven; ventrals two hundred and eighteen; anal bifid; subcaudals eighty-one pairs; thirty-nine transverse bands on body, seventeen on tail.

COLUBER ORNATUS B. & G.

San Pedro, Mexico.

Dorsals in fifteen rows; ventrals two hundred and five; anal bifid; subcaudals one hundred and fifty-one pairs;

total length thirty and three-fourths inches, tail nine and three-fourths. The specimen has not the dark color of the original description; it has the same squamation and similar disposition of lighter tints in place of the purple.

COLUBER TESTACEUS Say, 1823.

San Luis Potosi, Mexico.

Dorsal rows seventeen; ventrals one hundred and ninety; anal bifid; subcaudals ninety-eight pairs. On the flanks there is a considerable amount of reddish color. Anteriorly, on the body, each scale has a brown streak along its centre; posteriorly, they are yellowish in the middle and have brown bodies. The general appearance is greyish or yellowish grey.

DIADOPHIS DECORATUS Gthr.; Cope.

Mountains of Alvarez, Mex.

Dorsal rows seventeen; ventrals one hundred and fifty-seven; anal bifid; subcaudals one hundred and nine; no scale pores; total length nine and a half, tail three and one-fourth inches. The top of the head is dark. From the nostril through the eye and on the neck there is a white band narrowly edged with black. The lower of the edgings persists, as a narrow streak, extending to the end of the tail. On the median row of the back there is another streak of black, which becomes more distinct behind the neck in the lighter brownish of the body; it also continues to the extremity. The lips are white, and have a few small spots of brown. The ventral scales along the entire body have at each end a small spot of black, making five vittæ in all. It is likely that in larger specimens the median vitta is lost in a darker ground.

DIADOPHIS TEXENSIS Kenn., 1860.

San Luis Potosi, Mex.

Dorsals in seventeen rows; ventrals two hundred and eleven; anal bifid; subcaudals seventy-one pairs.

RHINOCILUS TESSELLATUS Garm., 1883.

Coahuila, Mex.

Scales in twenty-three rows; ventrals one-hundred and seventy-eight; subcaudals thirty-seven entire plus fourteen pairs.

OPHIBOLUS MULTISTRATUS Kenn., 1860.

San Luis Potosi, Mex.

Dorsal rows twenty-three; ventrals two-hundred; subcaudals fifty-five pairs; dark transverse bands sixty-two on body, seventeen on tail; total length thirty-one and five-eighths inches, tail five and one-eighth. Another specimen has ventrals one hundred and ninety-five; subcaudals fifty-six pairs; black bands sixty plus sixteen. Kennicott says of the type "the black rings extend but a short distance upon the abdominal scuta, leaving the abdomen destitute of blotches, though it is faintly and sparsely punctulated." Our specimens have more of the dark color on the belly.

TANTILLA CORONATA B. & G., 1853.

San Luis Potosi, Mex.

Dorsal rows fifteen; ventrals one hundred and fifty-four; anal bifid; subcaudals sixty-three pairs. The type specimen from Mississippi had ventrals one hundred and forty-three, and subcaudals thirty-five pairs. The specimens described by Dumeril and Bocourt, from Mexico, have one hundred and seventy-two to one hundred and seventy-seven ventrals. One from Beaufort, North Carolina, has ventrals one hundred and thirty-three, anal bifid, and fifty-one pairs of subcaudals.

GEOPIUS LATIFRONTALIS Garm., 1883.

Fifty miles south of San Luis Potosi, Mex.

Dorsal rows seventeen; ventrals one hundred and seventy-nine; anal entire; subcaudals thirty-two pairs.

STENOSTOMA MYOPICUM Garm., 1883.

Tampico, Mex.

STENOSTOMA TENUICULUM Garm., 1883.

San Luis Potosi, Mex.

STENOSTOMA RUBELLUM Garm., 1883.

Uvalde, Tex.

EUMECES LYNXE Wiegman; Boc.

Mountains of Alvarez, Mex.

LYGOSOMA LATERALE Say; D. & B.

Goliad, Goliad Co., Tex.

CNEMIDOPHIORUS GULARIS B. & G., 1852.

San Antonio, Tex.

Pores seventeen plus sixteen; thirty-five transverse series of scales from gular fold to pores.

Laredo.

Pores nineteen plus nineteen; thirty-one series from fold to pores.

San Luis Potosi, Mex.

Pores eighteen plus nineteen; transverse series of scales from fold to pores thirty-two.

GERRHONOTUS IMBRICATUS Wiegman, 1828.

City of Mexico.

There is a brownish line between the mesial keels of

the back; the sides of face and neck are sprinkled with white.

San Luis Potosi, Mexico.

On these the back is sprinkled with spots of white, less than a scale in size.

GERRHONOTUS CÆRULEUS *Wieg.*, 1828.

San Luis Potosi, Mex.

PHRYNOSOMA CORNUTUM *Harl.*; *Gray.*

Monclova, Mex.; San Pedro, Mex.; San Antonio, Tex.

The largest specimen has a length of six inches, body four and an eighth; greatest width two and three-fourths inches.

PHRYNOSOMA ORBICULARE *Wieg.*, 1828.

City of Mexico; San Luis Potosi, Mex.; Sutherland Springs, Tex.

The femoral pores on a dozen specimens range in number from eleven to eighteen on a side.

PHRYNOSOMA MODESTUM *Girard*, 1852.

San Pedro, Parras, Saltillo and Monclova, Mex.

On nine specimens the number of femoral pores ranges from nine to seventeen on a side. The series make a turn backward as they meet in the middle, instead of an angle directed forward as in the preceding.

HOLBROOKIA MACULATA *Girard*, 1851.

From San Luis Potosi and Concordia, Mex.

Compared with others from Dakota these specimens are less uniform in color. The black spots on the back are more distinct as also the white at their hinder borders. The black marks at the side of the abdomen are more intense and extend farther under the belly. The northern spec-

imens have a more bleached or faded appearance. The lowest number of femoral pores on a side is eleven, the highest fourteen.

HOLBROOKIA TEXANA *Trosch.*; *B. & G.*

From Parras, Monclova and Saltillo, Mex.

The femoral pores number from sixteen to seventeen on each side.

HOLBROOKIA PROPINQUA *B. & G.*, 1852.

Guaymas.

On four specimens the number of pores on a side varies from eleven to fourteen. This species and those of *Callisaurus* and *Uta* do not belong to Dr. Palmer's collection.

The longitudinal fold or groove immediately behind the symphysis under the chin of the *Ophidia* is apparently duplicated in the species of *Holbrookia*, *Callisaurus*, *Uta*, and, probably, of *Uma*. That this peculiarity is accompanied by ability to enlarge the mouth opening by means of separation of the branches of the lower jaw at their junction is hardly possible. The rigid alcoholic specimens at hand are not the best for deciding the question. Yet it is certain that, in comparison with other lizards, there is a decided lack of firmness and solidity in the symphysial attachment which is very suggestive of its elasticity and flexibility in the earlier stages of the species. The presence of the fold seems to characterize a group of the *Iguanidae* of close affinities in other respects.

CALLISAURUS DRACONOIDES *Blainv.*, 1835.

Cape St. Lucas, Lower Cal.; Guaymas.

Pores varying from fourteen to sixteen on a side.

UTA STANSBURIANA *B. & G.*, 1852.

San Diego, Cal.

Pores fifteen plus fourteen.

UTA ORNATA B. & G., 1852.

Guaymas; San Francisco, Cal.

Pores varying in number from ten to thirteen on each side.

CROTAPHYTUS COLLARIS Say; Holbr.

Monclova, Mex.

The exterior of the two oblique bands on the neck is broken into four or five spots. On the body behind the black collar there are six transverse series of black spots, the median pair of each being larger and more intense in color. Lighter spaces separate the spots and form cross-bands, as in specimens from Arkansas.

SCELOPORUS TORQUATUS Wieg., 1828.

Concordia, near Saltillo, Mexico.

SCELOPORUS POINSETTII B. & G., 1852.

Monclova and San Luis Potosi, Mexico.

SCELOPORUS SPINOSUS Wieg., 1828.

San Antonio, Texas; San Pedro, Mexico.

Dr. Boulenger states, 1885, that this species "appears to be completely linked with *S. undulatus*" through the variety *S. clarkii* B. & G.

SCELOPORUS SCALARIS Wieg., 1828.

Concordia, thirty miles north of Saltillo, Mexico; City of Mexico.

SCELOPORUS GRAMMICUS Wieg., 1828.

San Luis Potosi, Mexico.

SCELOPORUS MICROLEPIDOTUS Wieg., 1834.

City of Mexico.

SCELOPORUS COUCHII Baird, 1858.

Monclova, Mexico.

Head shields smooth; a series of broadly dilated transverse supraoculars; two canthal scales; occipital large, about as broad as long; parietals small, three on each side; two frontoparietals, in contact behind the frontal; anterior border of the ear with four or five pointed slightly enlarged scales. Dorsal scales as large as ventrals, keeled, blunt-angled or rounded on the posterior margin, longitudinal series gradually converging toward the vertebral; near eighty series from occipital to base of tail; about twenty scales correspond in length to the shielded part of the head; lateral scales small, very small or granular in the posterior third of the flank, in front of the thigh, keeled, directed obliquely toward the back; ventral scales smooth, blunt or bicuspid; a series around the middle of the body includes about eighty scales. The adpressed hind limb, with the foot, reaches between the ear and the eye; tibia as long as the shielded part of the head; the distance from the base of the fifth toe to the extremity of the fourth is longer than from the end of the snout to the ear. Series of femoral pores thirteen to sixteen each, not meeting. The caudal scales are larger than the dorsals. Male with enlarged post-anal scales. Greenish olive above, with a series of irregular spots of black on each side of the middle of the back, and a lighter band at the upper edge of each flank. Below this light band a black one extends from the eye to the thigh, broken into spots anteriorly, becoming more distinct and broader as it nears the leg; below the dark band a lighter one runs from arm to leg on the lower edge of the flank. Chin and throat have transverse bands of dark and light color, bending backward toward the median line. A black blotch in front of the shoulder. Dark bands across arm and leg. Male with a blue dark-edged blotch on each side of the belly.

Originally described from Pesquiera Grande, and New Leon, Mexico. The lack of details in the note by Professor Baird furnishes a reason for those given above.

EUBLEPHARIS VARIEGATUS Baird; Blgr.

Monclova, Mexico.

CINOSTERNUM HIRTIPES Wagl., 1830.

San Luis Potosi, Mexico.

EMYS ORNATA Gray, 1831.

San Pedro, Chihuahua, Mexico.

Three young specimens in the collection differ somewhat from the typical *E. ornata*. They have a rounded spot of yellow at the upper hinder margin of the orbit; behind this a short distance there is a broad subelliptical spot of the same color that is not connected with the yellow spot in front, or the yellow streak behind it. In this position *E. ornata* has a continuous longitudinal band. On the lower jaw, a little in front of the angle of the mouth, these specimens have an elongate spot with rounded extremities, also disconnected. The median band under the chin continues backward without a break.

A fourth specimen, however, is unlike the preceding in that the large spot, on one side of the head, is connected with both the small one behind the eye and the streak on the neck. On the other side of the head the large spot is connected with the streak but not with the spot behind the orbit, though extending a sharp angle toward it. This specimen agrees, on one side, with *E. ornata* as figured by Dr. Günther in Biol. Cent. Amer. Rept., pl. 1.

ASPIDONECTES EMORYI Agassiz, 1857.

San Antonio, Texas.

RANA MONTEZUMÆ Baird, 1855.

City of Mexico.

The specimens from this locality show a great deal of individual variation ; it ranges from those in which a light ground color is marked with numerous spots of brown to those on which the ground is so dark brown the spots are invisible.

RANA BERLANDIERI *Baird*, 1858.

Monclova, San Pedro, and San Luis Potosi, Mexico.

But one of the lot has the foot webbed as figured by Baird, Mex. Bound., pl. 36, fig. 10. Commonly the membranes do not extend nearly so far toward the end of the longest toe. Whether the more complete web is a local peculiarity can only be determined by more specimens.

The Monclova representatives of this variety of *R. virescens* Kalm, 1761 (*R. halecina* Schreb., 1782, in synon.), are of an ashy color, with the central portions of the spots much faded.

ENGYSTOMA CAROLINENSE *Holbr.*, 1836.

Corpus Christi, Mexico ; Goliad, Goliad Co., Tex.

These types have the single tarsal tubercle ; the snout is moderately long ; the color is more uniform than in those from Carolina ; the longitudinal bands are absent, and there are a few scattered spots of black on back and top of legs.

PALUDICOLA NITIDA *Pet. ; Blgr.*

Sierra de San Miguelito, nine leagues south of San Luis Potosi.

BUFO VALLICEPS *Wieg.*, 1833.

Corpus Christi and Monclova, Mexico ; San Antonio, Texas.

Adults from Monclova are without the dark mottling beneath. The young have an extensive patch of brownish along the median line, from the throat to the posterior

portion of the abdomen; there is a light band from one supraciliary to the other, bending back in the middle; a double series of small spots of brown extends along the middle of the back from the occiput: crown flat, without indications of ridges or concavity; paratoids rounded, a series of prominent warts is continued back from the lower margin of the gland. Those from San Antonio are much darker, above and below.

BUFO COGNATUS Say, 1823.

San Luis Potosi; nine leagues south of San Luis Potosi; mountains of Alvarez.

The spots are smaller than on those from Kansas. The frontal ridges approach each other closely between the anterior ends of the orbits; from this point to the end of the snout the ridges are parallel with a very narrow groove between them. On *B. lentiginosus* and *B. americanus* this rostral groove widens toward the frontal region.

BUFO SPECIOSUS Girard, 1854.

San Pedro, Mexico.

Heretofore this toad has been placed in *B. compactilis*, a warrant for which we do not find in comparison of adult examples. While in small- to medium-sized the bony ridges of the crown are indistinct or low, on large ones they become moderately prominent. On both young and old the interorbital space is concave, and between the forward extremities of the upper eyelid there is a pair of prominences, more or less coalescing to form a transverse ridge. The supraorbital ridge meets the postorbital at a very open angle, and from the junction a short parietal ridge passes backward (as figured in pl. 40, fig. 7, Mex. Bound. Surv.). In the average the spots are larger than those of *B. com-*

pacilis, the interspaces more distinct, the general appearance smoother and the ground color lighter. A male has a single opening to the gular sac, on the left side.

There is not enough in the description of *B. dipternus*, from Montana, to separate it from half-grown *B. speciosus*.

BUFO COMPACTILIS *Wieg.*, 1833.

Monclova and Corpus Christi, Mex.

Readily distinguished from the preceding by the flat crown, the lack of the ridges, the rougher, more warty skin and the darker ground color.

BUFO PUNCTATUS *B. & G.*, 1852.

Monclova; nine leagues south of San Luis Potosi; Sierra Nola, Tamaulipas, Mex.

On the adult there is a slight supraorbital ridge and a shallow concavity on the broad crown. The preorbital and the postorbital ridges are quite prominent; the labial border is much expanded at the angle of the mouth; the black dots persist on the ventral surfaces.

BUFO DEBILIS *Girard*, 1854.

San Antonio, Tex. •

Young specimens bear some resemblance to those of *B. punctatus*. The paratoids are longer. Individuals of about three-quarters of an inch in length usually have a single dark spot under each shoulder (*B. insidior* Girard) otherwise the lower surface is uniform yellowish.

ACRIS CREPITANS *Baird*, 1854.

Uvalde, Sutherland Springs, and San Antonio, Tex.

HYLA EXIMIA *Baird*, 1854.

Mountains of Alvarez and City of Mexico.

SCAPHIOPUS COUCHII Baird, 1854.

Monclova, Savineto, San Luis Potosi, and nine leagues south of San Luis Potosi.

AMBLYSTOMA MEXICANUM Shaw; Cope.

The colors vary from very light with brown spots to dark brown. This species may be distinguished from *A. mavortium*, in the same stages, by the slenderness of the band of palatine teeth. Most often, in specimens half grown or more, these teeth form a single series, rarely more, a condition only reached by *mavortium* on losing the gills. The multitude of small black spots also aids in characterizing *A. mexicanum*; the other is more likely to be nearly or entirely without spots on the belly. The palatine teeth of the larval *A. tigrinum* are like those of *A. mavortium*, but the latter appears to remain longer or become larger in the larval stages, often becoming sexually mature without transforming.



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